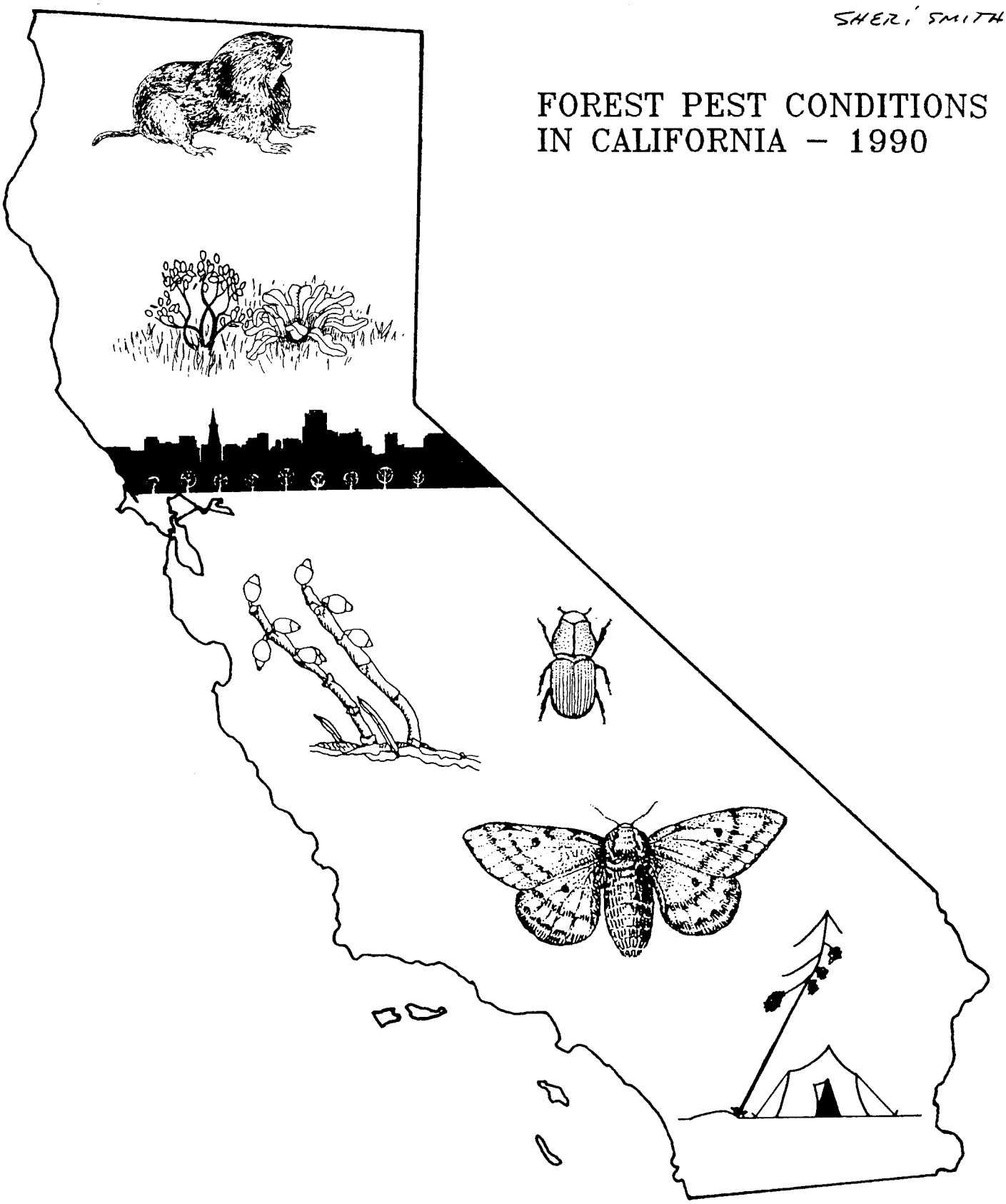
SHERI SMITH

FOREST PEST CONDITIONS IN CALIFORNIA – 1990



A Publication of the California Forest Pest Council

THE CALIFORNIA FOREST PEST COUNCIL (formerly the California Forest Pest Control Action Council) was founded in 1951. Membership is open to public and private forest managers, foresters, silviculturists, entomologists, pathologists, zoologists, and others interested in the protection of forests from damage caused by animals, diseases, insects, and weeds. The council's objective is to establish, maintain, and improve communication among individuals -- managers, administrators, and researchers -- who are concerned with these issues. This objective is accomplished by four actions:

1. Coordination of detection, reporting, and compilation of pest damage information.

2. Evaluation of pest conditions.

3. Pest control recommendations made to forest managing agencies and landowners.

4. Review of policy, legal, and research aspects of forest pest control, and submission of recommendations thereon to appropriate authorities.

The California Board of Forestry recognizes the Council as an advisory body in forest pest protection. The Council is a participating member in the Western Forest Pest Committee of the Western Forestry and Conservation Association.

The report, **FOREST PEST CONDITIONS IN CALIFORNIA - 1990**, is compiled for public and private forest land managers to keep them informed of pest conditions on forested land in California, and as an historical record of pest trends and occurrences. The report is based largely on information provided by three sources: (1) the state-wide Cooperative Forest Pest Survey, in which federal, state, and private foresters and land managers participate, (2) information generated by Forest Pest Management, Pacific Southwest Region, USDA-Forest Service, while making formal detection surveys and biological evaluations, and (3) reports and surveys of conditions on private lands provided by personnel of the California Department of Forestry and Fire Protection.

This report was prepared by the U.S. Forest Service in cooperation with other member organizations of the Council. It was duplicated and distributed by the California Department of Forestry and Fire Protection.

Cover: Forest pests in California include a wide range of of insects, weeds, plant diseases, and damage from animals. Each vegetative type and situation, such as recreation sites, has its own complex of potential pest problems.

Sacramento January 25, 1991

FOREST PEST CONDITIONS IN CALIFORNIA - 1990

TABLE OF CONTENTS

HIGHLIGHTS OF PEST CONDITIONS - 1990

The continuing drought was the most salient factor that affected the forests of California in 1990. Across California, over seven million trees of commercial size have died as a result of the insects and pathogens that gain advantage from the moisture stress in host trees initiated and magnified by drought. In the Tahoe Basin, 800,000 trees, one out of five, have died. Tree mortality continued to be widespread throughout Southern California forests, where the effects of drought are accented by air pollution.

STATUS OF INSECTS. Defoliating insects occurred at endemic levels. Sucking insects, such as aphids and scales, were reported, but did not have major impacts in forest settings. Bark beetle attacks on drought-stressed trees continued into and throughout 1990. All commercial conifer species were represented in the mortality. Losses in numbers of trees and volume have been particularly severe in the true firs of the Sierra Nevada Mountains. Losses in some Southern California pine forests continue to severely deteriorate stand structure.

STATUS OF DISEASES.

Dwarf mistletoes and root disease fungi were the most important pathogens interacting with drought to cause tree mortality. Water theft by the parasitic dwarf mistletoes and inadequate root capacity brought about by root disease help create the host stresses that make feasible successful insect attacks. Tree species most affected were ponderosa pine, white fir and red fir.

Dutch elm disease has expanded into the Central Valley. Five trees were confirmed from Isleton, a town 30 miles south of Sacramento. Subsequently, four trees were confirmed in the city of Sacramento, which has a street elm population of 17,500. These are the first diseased elms reported in Sacramento County. A quarantine has been established in portions of Sacramento, San Joaquin and Yolo Counties.

Pitch canker was reported as found on planted ponderosa pine near Cabrillo College (Santa Cruz County). This is the first report of pitch canker on ponderosa pine in California. Pitch canker was also seen on planted Coulter pine in Monterey County.

Hardwood foliage diseases were more noticeable in 1990 in northern California, presumably as a result of rains in May.

STATUS OF ANIMAL DAMAGE

A variety of mammal species caused damage to forest trees. All of California's major timber producing regions and timber types reported damage caused by vertebrate species. The majority of damage reported was caused by deer, pocket gopher, porcupine, rabbit, and domestic stock. No damage was reported for birds.

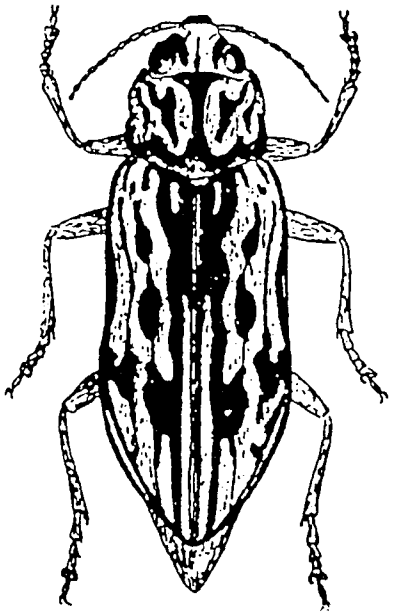
STATUS OF WEEDS

A fourth year of drought intensified vegetative competition in much of California and impeded reforestation efforts. Private land managers continue to use a spectrum of available herbicides to ensure successful regeneration; meanwhile the U.S. Forest Service has completed a seventh growing season without herbicides.

Figure 1. Attendees at the insect committee field meeting discuss research examining the potential of insect populations for the selective suppression of competing vegetation, Lassen National Forest, May 23, 1990.

STATUS AND CONTROL OF INSECTS

A Report to the California Forest Pest Council from the Insect Committee



Don Owen, Chair
John W. Dale, Secretary

Edited by John W. Dale
December 14, 1990

STATUS AND CONTROL OF INSECTS

WESTERN PINE BEETLE, Dendroctonus brevicomis.

North Coast. Ponderosa pine mortality increased from previous years, and incidence is believed to be a result of the cumulative impacts of drought. Specific areas of infestation include the area east of Morgan Hill (Santa Clara County), throughout pine areas of Lake, Napa, and Mendocino Counties, and in southwestern Trinity County. Numerous group kills of fire-injured ponderosa pines occurred in Trinity County. Several groups contained 30+ mature and overmature trees. Management at Boggs Mountain Demonstration State Forest (Lake County) removed or targeted for removal nearly 225 trees attacked in groups of 2 to 5 by the western pine beetle. Normal stocking levels had become overstocking during the current drought.

Aerial surveillance revealed Coulter pine mortality in southeastern Alameda County. The size of dead trees indicated attack by western pine beetles, but trees were not observed from the ground.

Northern. Mortality caused by the western pine beetle increased in northwestern California. Single trees or small groups of ponderosa pines were commonly involved, but some groups contained up to 30 trees. Some larger groups of kills also occurred in stands damaged by high winds on the Covelo Ranger District, Mendocino National Forest, and around the edge of the Hermit Fire, Yolla Bolla Ranger District, Shasta-Trinity National Forest.

Ponderosa pines killed by western and mountain pine beetles usually were associated with annosus root disease centers on the Devil's Garden Ranger District, Modoc National Forest. Trees killed varied from the small pole class to overmature sawtimber. Although scattered, mortality was common enough that the total may exceed one tree per acre. Ponderosa pine dying in the McCloud Flats and Pondosa areas (Siskiyou County) usually were weakened by blackstain root disease before they perished.

Sierra. Western pine beetle/drought-related mortality continued at above normal levels throughout the mid- to lower-elevation westside pine and mixed conifer stands. Increased levels of mortality were particularly evident in the southern Sierra, especially on the Mariposa and Kings River Districts (Sierra National Forest) and the Tule River, Hot Springs, and Greenhorn Districts (Sequoia National Forest). Mortality occurred as scattered, relatively small, three to ten tree groups as well as large centers of 100+ trees covering several acres. Such large pockets of mortality were reported from the Deer Creek SOHA (Spotted Owl Habitat Area) on the Miwok District (Stanislaus National Forest) and the Davis SOHA on the Greenhorn District (Sequoia National Forest).

Southern California. As a result of the continued drought and related impacts caused by smog, bark beetles continue to cause limited but widespread damage on the San Bernardino National Forest. However, insect populations have increased during the spring and summer of 1990, and larger group-kills are expected in late fall and the spring of 1991. It is estimated that 250 acres of coniferous vegetation has experienced damage thus far. The San Jacinto Ranger District has a majority of the mortality. The San Gorgonio and Big Bear Ranger Districts are experiencing increasing and scattered amounts of timber

killed by bark beetles. Approximately 3.5 MMBF of timber trees have died on the San Bernardio National Forest as a result of all species of bark beetles.

Heavy mortality (2000+ trees) continued in the vicinity of Mt. Palomar and Julian in San Diego County. Entire Coulter pine stands have been lost, although residual pockets of the bigcone Douglas-fir/coast live oak component remain. Approximately two-thirds of the mortality is occurring on private land within the boundary of the Cleveland National Forest. It appears that mortality will continue until a break occurs in the drought. Small salvage sales are ongoing, but there is a lack of operators.

PINE ENGRAVER BEETLES, Ips spp.

North Coast. Pine engraver activity was prevalent in pine areas throughout the region. In addition to areas with western pine beetle, pine engravers also attacked Monterey pines stressed by pitch canker infections in Hayward, Alameda County, and several areas in Santa Cruz County. Other San Francisco Bay Area communities incurred pine engraver attacks on ornamental pines likely stressed by watering restrictions.

Northern. Top-killing of pines by pine engravers was evident in a few locations in northwestern California. Several spots involving at least 30 sawtimber size ponderosa pine were top-killed near Mendocino Pass, Mendocino County. Pine engravers, along with western pine beetle and red turpentine beetle, were responsible for numerous one-acre mortality spots from Trinity to Lake County in ponderosa pine 70-100 years of age. Pine engravers also killed groups of knobcone pine in the Sacramento River Canyon (Siskiyou County).

Sierra. Pine engraver activity was associated with much of the continued above normal levels of mortality throughout the Sierra (see Western Pine Beetle). Pine engraver mortality was also reported to residual pines left after a pre-commercial thinning of a 7 to 8 year-old plantation near McCormick Meadows on the Calaveras District, Stanislaus National Forest.

Southern California. Species of engravers, along with the western pine beetle, red turpentine beetle and flatheaded borers, have caused the loss of 3.5 MMBF on the San Bernardino National Forest. Engravers also were active in the losses occurring in the Mt. Palomar, Lost Valley, and Julian areas of San Diego County. Sanitation-salvage crews of the California Department of Forestry and Fire Protection have removed 2 MMBF of dead and dying trees on private property in San Bernardino and Riverside Counties.

FIR ENGRAVER, Scolytus ventralis.

North Coast. Scattered mortality of white fir occurred in portions of Mendocino, Lake, and Humboldt Counties. Several grand fir were killed in and near Dunlap Campground in Jackson Demonstration State Forest, Mendocino County. Several attacked grand firs in the nearby drainage of the North Fork Big River were within centers of annosus root disease. Firs in the campground also were attacked by the roundheaded fir borer, Tetropium abietis.

Northern. Mortality of red and white fir was scattered, but visibly at high levels in northwestern California. The fir engraver and Scolytus praeceps were commonly involved in the white fir mortality. The fir roundheaded borer,

Tetropium abietis, and Scolytus subscaber were found attacking red fir. The highest concentrations of both red and white fir mortality were within the lower elevational distributions of the species. Mortality of isolated white fir of all size classes was common in the mixed conifer type.

Sierra. High levels of true fir mortality associated with fir engraver activity continued in and around Lake Tahoe. Above normal fir mortality was also reported in mid- to upper-elevation mixed conifer and fir stands on the Pacific and Placerville Districts, Eldorado National Forest; the Calaveras and Summit Districts, Stanislaus National Forest; the Mariposa District, Sierra National Forest; and in the vicinity of Breckenridge Mountain, Sequoia National Forest. Poor crown condition, reduced live crowns, and clear pitch streaming on the bole of true firs were frequently associated with the mortality.

North of Mammoth Lakes, Inyo County, scattered dead and dying trees, mostly fir, occurred mainly to the west of Highway 395. Areas with higher concentrations of mortality included the Sherwin Range and Smokey Bear Flat. The majority of tree mortality is inaccessible due to terrain or the lack of a road system.

Southern California. Tree and branch mortality from this engraver occurred across the San Bernardino National Forest. Damage increased on the Arrowhead Ranger District, but the majority of engraver activity was found on unmanaged lands adjacent to Barton Flats, on steeper slopes of the Big Bear Ranger District (San Bernardino County), and on the San Jacinto Ranger District (Riverside County). Drought and engravers also were responsible for mortality of white fir on private property in Riverside County.

RED TURPENTINE BEETLE, Dendroctonus ventralis.

North Coast. Ponderosa pine in several areas had red turpentine beetle associated with attacks by western pine beetle. Monterey pines with pitch canker (Santa Cruz County) were attacked and killed by the red turpentine beetle alone.

Northern. Evidence of attack by red turpentine beetle on ponderosa and sugar pines was widespread in northwestern California. Both the number of attacks per tree, and the height of the attacks on the boles, indicate that the red turpentine beetle was an important mortality factor this year. Prolonged drought was the underlying factor responsible for widespread infestations of this beetle. Attacks were more concentrated in areas suffering from additional stress factors, such as harsh sites, overstocking, or dwarf mistletoe infestation. Red turpentine beetle attacks were very abundant around established black stain root disease centers on McCloud Flats, Siskiyou County. This beetle also was involved in mortality of 20-year old Monterey pine planted at Lake Mendocino Park, Mendocino County.

Southern California. Jeffrey pine on Barton Bench, San Gorgonio Ranger District, and in Grass Valley, Arrowhead Ranger District, San Bernardino National Forest, have been attacked to a height of 20 feet. This unusual height is indicative of severe host stress.

FIR FLATHEADED BORER, Melanophila drummondi.

North Coast. Borers attacked senescent Douglas-fir at Howard Forest, Mendocino County. Incidence elsewhere in the region has declined from previous years.

Northern. Douglas-firs injured by fires in 1987 and 1988 in northwestern California are beginning to die from infestations of fir flatheaded borer. Several consecutive years of drought have undoubtedly been a major factor in this mortality. Fir flatheaded borer, in combination with drought and exposure, has also caused the loss of some mature Douglas-fir along the edges of several areas that were clearcut in Trinity County approximately five years ago.

MOUNTAIN PINE BEETLE, Dendroctonus ponderosae.

North Coast. Attacks by the mountain pine beetle caused mortality of drought-stressed mature and old growth sugar pine in many parts of the North Coast Range. From Lake County northward to Del Norte and Siskiyou Counties, there are numerous areas were it is possible to see from 3 to 10 currently dead sugar pines from a single observation point. Near Mendocino Pass, Mendocino County, mountain pine beetle also began to kill small groups of suppressed, understory ponderosa pine which were infected with dwarf mistletoe. All five of the identified blister rust resistant sugar pines located on the Mendocino National Forest were treated with carbaryl insecticide during the spring of 1990 in order to prevent attacks by mountain pine beetle.

Northern. Groups of 20 to 30 sawtimber-size ponderosa pine were killed in the area from Plum Valley Campground to Benton Meadows, Warner Mountain Ranger District, Modoc National Forest. Drought stress made successful attacks possible. Ponderosa pines killed by mountain pine beetle usually were associated with annosus root disease centers on the Devil's Garden Ranger District, Modoc National Forest. Scattered ponderosa pine mortality in the vicinity of Grass Lake (Siskiyou County) was attributed to the mountain pine beetle and Ips pini.

ROUNDHEADED FIR BORER, Tetropium abietis.

Northern and Sierra. This wood borer has been common in red fir during the current drought. Attacks lower on the bole may preceed or follow attacks by the fir engraver higher up the bole and in the crown. It was not uncommon to find red fir with either green or slightly off-color foliage. These firs had exit holes of the fir borer, and its white boring dust was lodged in bark crevices.

DOUGLAS-FIR BEETLE, Dendroctonus pseudotsugae.

North Coast. About one dozen Douglas-firs at Howard Forest, Mendocino County, were attacked by Douglas-fir beetles. Most of these trees also were attacked by fir flatheaded borers. A group of four overmature Douglas-firs infested with the Douglas-fir beetle was discovered in a timber sale near Pothole Creek on the Covelo Ranger District, Mendocino National Forest. The infesting beetles were thought to have originated in windthrow resulting from a

storm in December 1988. Evidence of Douglas-fir beetle breeding in scattered windthrow from this storm has been noted in several locations in the Coast Range. However, only some of these situations resulted in an increase in Douglas-fir mortality.

JEFFREY PINE BEETLE, Dendroctonus jeffreyi.

Sierra. Jeffrey pine beetle mortality was reported as only slightly above normal on the Mammoth and Mono Lake Districts, Sierra National Forest.

CALIFORNIA FLATHEADED BORER, Melanophila californica.

Southern California. This beetle has often been a very important pine pest on the San Bernardino National Forest. In 1990 it was a primary cause of pine mortality in Garner Valley, San Jacinto Ranger District, and Barton Bench (Heart Bar Recreation Area), San Gorgonio Ranger District.

EUCALYPTUS LONGHORNED BORER, Phoracantha semipunctata.

North Coast. This borer was not detected in any new counties within the region. However, a new detection was confirmed in Livermore, Alameda County.

Southern California. Applications of traditional forest management principles have reduced problems in urban stands.

DOUGLAS-FIR TUSSOCK MOTH, Orgyia pseudotsugata. Populations on the Plumas and Lassen National Forests remain at endemic levels.

MODOC BUDWORM, Choristoneura retiniana. Visible defoliation of white fir occurred on the Warner Mountain Ranger District, Modoc National Forest, from Benton Meadow to Lake City Canyon (Modoc County). Defoliation was not reported in 1989.

A CALIFORNIA SPRUCE BUDWORM, Choristoneura carnana californica.

Northern. This defoliator of Douglas-fir has remained at endemic levels since the end of the Trinity County outbreak in 1985.

GYPSY MOTH, Lymantria dispar.

California.

North Coast. The California Department of Food and Agriculture applied a ground treatment of dimilin at a Bay-front apartment complex in Marin County in the spring of 1990. This was the Tiburon property where 17 moths were trapped in 1989. Male moths were trapped in both Santa Clara and Santa Cruz Counties. In Santa Clara County one moth was caught in Los Altos Hills and one in San Jose. In Santa Cruz County one moth was caught in Aptos and one in Henry Cowell Campground near Felton (Tables I, II).

Northern. Moths were trapped in Nevada, Sacramento, and San Joaquin Counties.

Southern California. Moths were trapped in Los Angeles, Santa Barbara, and San Diego Counties. One pupal case was found in La Mesa in September 1990. An egg mass survey will be conducted in 1991 in the vicinity of the trap catches that occurred in Santa Barbara County.

TABLE I. CALIFORNIA GYPSY MOTH SITUATION - 1990[a]

Years	Traps Placed	Adults Trapped	Counties	Properties with Viable Egg Masses/ Pupal Cases	Sites Treated
1984	30,000	25	9	2	5
1985	28,000	28	10	3	2
1986	27,000	20	9	1	0
1987	19,000	6	5	1	1
1988	20,000	13	6	0	0
1989	21,000	56	14	2	0
1990	21,000	24	8	0	1

[a]As of August 8, 1990.

TABLE II. LOCATION OF GYPSY MOTHS CAUGHT IN CALIFORNIA IN 1990

County	City
Los Angeles	Diamond Br (1), Lynwood (1), Long Beach (1), Mira Mesa (1)
Nevada	Grass Valley (2)
Sacramento	Carmichael (3)
San Diego	La Mesa (4), Vista (2)
San Joaquin	Stockton (1)
Santa Barbara	Santa Barbara (4)
Santa Clara	San Jose (1), Los Altos Hills (1)
Santa Cruz	Aptos (1), Felton (1)

(#) Number of adult moths trapped.

Oregon[b]

An extensive outbreak of the gypsy moth was detected in Lane County, Oregon in 1984. The proximity of this outbreak to California presented the greatest potential to date for the introduction and establishment of gypsy moth into California. For this reason, **Forest Pest Conditions in California** continues to report on the status of gypsy moth in Oregon.

Status at the end of the 1989 Season. In 1989, approximately 22,250 gypsy moths traps were placed statewide. Only two gypsy moths were detected, about three miles apart in Euguene, Lane County. This was the fewest caught in the state since 1979, the year gypsy moths were first detected in Oregon. No Gypsy

moths were caught in Lake Oswego, Clackamas County -- the only site receiving eradicative sprays of Bacillus thuringiensis in 1989. For the first time since 1980, no eradication programs were planned for 1990.

1990 Survey Program. Approximately 16,335 traps were placed statewide. Along with 11,680 detection traps and 3,755 delimitation traps, 900 additional delimitation traps were added in response to new gypsy moth detections. As in previous years, gypsy moth survey and detection traps were concentrated in western Oregon, where most of the suitable habitat and population centers occur. The standard detection trap density was 1-4 traps/square mile. Delimitation trap densities of 16-49 traps/sq mi were placed at all 1989 detection sites, and were used to monitor previous eradication areas. No mass trapping was done in 1990. Special sites such as state and national parks, public and private campgrounds, and RV parks were also trapped.

Nineteen gypsy moths were detected (Table III). All detections were in western Oregon; only two traps had multiple catches. Detections were made in nine general areas from north to south as follows: Warrenton (two moths in one trap), Hillsboro (one moth in one trap), West Portland (two single moths in two traps), Lake Oswego (four moths in one trap, plus four scattered singles), Estacada (one moth in one trap), Eugene (two single moths in two traps), Rogue River (two single moths in two traps), and Cave Junction (one moth in one trap) (Table III).

The two gypsy moths in Eugene were caught about a mile southwest of each of the two single detections made there in 1989. Over 19,000 moths were detected in Lane County in 1984, and the 1990 trapping reflects the success of the earlier eradication projects in combination with the detection and delimitation trapping programs. About 6,000 traps were placed in Lane County this year. The multiple detection in Lake Oswego (four moths) is about 1/3 mile northeast of the 1989 eradication area. This is likely to be a new introduction site as several new residents from the northeast have been identified in the immediate area.

Projected Eradication and Survey Programs in 1991. Additional surveys of recent arrivals from the Northeast and subsequent egg mass searches are planned at up to five sites where new detections were made: Cave Junction, Estacada, Lake Oswego, Rogue River, and Warrenton. Any eradication programs for 1991 will be based on the results of egg mass searches and detection data in those areas. Eradication programs would likely be less than 640 acres and use Bacillus thuringiensis applied from the ground. A reduced trapping program is projected for 1991 because most of Lane County has been free of gypsy moths for four years. Delimitation trapping around all 1990 gypsy moth detections, and any eradication sites, will supplement the usual survey program.

Eastern United States.

Estimates of defoliation by the gypsy moth in 1991 exceed 7 million acres -- a 4 million acre increase over 1989 and nearly 6 million over 1988. This may result in increased detections of gypsy moth by the California Department of Food and Agriculture in 1991 or 1992.

Table III. Summary of 1990 Gypsy Moth Detections in Oregon[b]

County	City/Area	Total Males Caught	Trap Density
Clackamas	Estacada	1	1/sq mi (increased)
	Lake Oswego	8	16/sq mi (increased)
Clatsop	Warrenton	2	2/sq mi (increased)
Jackson	Rogue River	2	1/sq mi (increased)
Josephine	Cave Junction	1	1/sq mi (increased)
Lane	Eugene	2	16-49/sq mi (increased)
Washington	Hillsboro	1	4/sq mi
	Raleigh Hills, W. Portland	1	4/sq mi (increased)
	Sylvan Hills, W. Portland	1	4/sq mi (increased)
	Statewide total	**19**	

[b]Submitted by Alan D. Mudge, Oregon Department of Agriculture, 635 Capitol St. NE, Salem, OR 97310-0110

GRASSHOPPERS, Acrididae.

Sierra. A detection report from Tuolumne County indicated that Jeffrey pine and white fir plantation saplings 3 to 6 ft in height were damaged by short-horned grasshoppers. In the same county low levels of feeding injury were observed in two, 7-year old ponderosa/Jeffrey pine plantations on the Calaveras District, Stanislaus National Forest. No damage was observed on nearby one to two-year old plantations. The potential for significant grasshopper damage is recognized by the Groveland District, Stanislaus National Forest, in the large, often contiguous areas, that need to be regenerated following the recent fires.

CONIFER APHIDS, Cinara spp.

Sierra. Aphids continued to be abundant, but not at the levels of 1989.

TENT CATERPILLAR, Malacosoma sp.

Sierra. Low to moderate levels of defoliation on antelope bitterbrush were reported along Highway 89 between Truckee and Sierraville (Nevada and Sierra Counties). Tent caterpillar activity remained low in the Mommoth-Mono Lake area (Mono County).

SEQUOIA PITCH MOTH, Vespamina sequoiae.

North Coast. This insect continues to be a pest of ornamental Monterey pine throughout the region.

CALIFORNIA OAKMOTH, Phryganidia californica.

North Coast. Defoliation of coast live oak occurred in a few locales in Santa Cruz County.

FALL WEBWORM, Hyphantria cunea.

North Coast. Webbing and associated defoliation of Pacific madrone were noted in several areas of Santa Cruz County and in the Brooktrails area near Willits, Mendocino County.

BALSAM TWIG APHID, Mindarus abietinus.

Sierra. This aphid probably was responsible for damaged terminals and buds on approximately half of the white fir seedlings planted along with Douglas-fir over 200 to 250 acres of the Oroville Ranger District, Plumas National Forest, Plumas County.

Research on life history, damage, and suppression continued into the second year at Placerville Nursery, Eldorado County. Collections submitted to a specialist at the Illinois Natural History Survey indicate that the species may be Mindarus victoria, and not M. abietinus.

SPRUCE APHID, Elatobium abietinum.

North Coast. Continued attacks keep foliage sparse on planted roadside sitka spruce south of Eureka, Humboldt County.

MATSUCOCCUS SCALE, Matsucoccus sp.

North Coast. One to two dozen ponderosa pine in and around Loch Lomond, Lake County, had branch flagging similar to that caused by Matsucoccus scale. Only a few larvae similar to Matsucoccus were recovered from twig bark and identification was not conclusive. However, this area has had damage from Matsucoccus in the past.

OAK PIT SCALE, Asterolecanium minus.

North Coast. Most samples of branch decline of coast live oak from Diplodia sp. also had twig damage from oak pit scales. Limited sampling of oak branch flagging did not allow an accurate delimitation of oak pit scale incidence.

A GELECHIID LEAF SKELETONIZER, Chionodes trichostola.

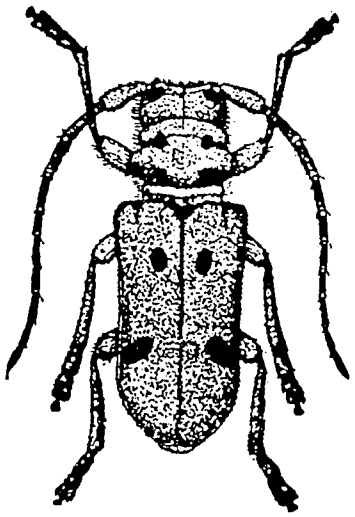
Northern. Larvae of this moth caused widespread defoliation of blue oak around the Sacramento Valley, especially Shasta and Tehama Counties. The larvae skeletonize the leaves, causing them to turn either partially or completely brown. There is one generation per year with most feeding damage being completed by the end of May. The majority of trees maintained their original compliment of leaves, albeit damaged, through the summer. Only the most heavily damaged trees refoliated. Although some locally severe defoliation was observed, little or no tree mortality occurred.

AN OAK LEAF GALL MIDGE, unknown.

North Coast. This was the second consecutive year of leaf galls on black oaks near Ukiah, Mendocino County. Damage was also noted on black oaks at Lake Pillsbury, Lake County. In the Ukiah infestation, there was an average of 4.3 galls per leaf throughout the crowns of infested black oaks. Attempts at rearing the larvae for purposes of adult identification were unsuccessful.

ASH WHITEFLY, Siphoninus phillyreae.

Southern and Northern California. Also known as the pomegranate, pear or peach whitefly, it was first found in California in July, 1988 on heavily infested ash trees in the San Fernando Valley area of Los Angeles County. New county records in 1990 extend the general distribution to 35 of the state's 58 counties (Figure 2).



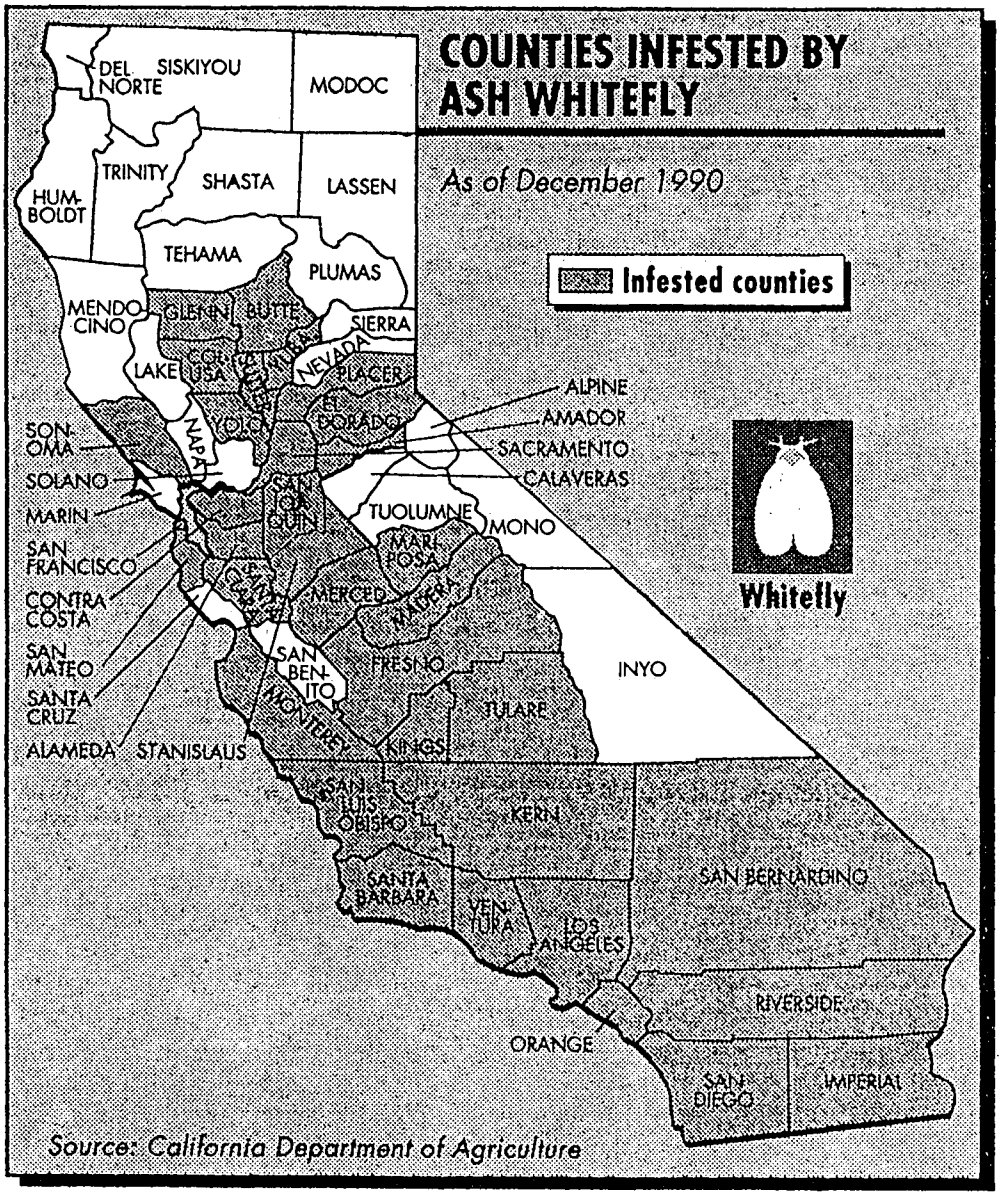


Figure 2. California counties with at least one collection record of the ash whitefly, Siphoninus phillyreae, since the original detection in Los Angeles County in 1988. (From: Gill, R.J. 1990. The Ash Whitefly in California. Cal. Dept. Food & Agr. 14 p., updated December 24, San Francisco Chronicle.)

TABLE IV. INSECTS OF LESSER IMPORTANCE IN CALIFORNIA - 1988

INSECTS			WHERE EXAMINED OR REPORTED	
Scientific Name	Common Name	Host	County	Remarks
Adelges cooleyi	Cooley gall aphid	BS	Siskiyou	Galls on twigs near Knopti Creek, Gasquet R.D., Six Rivers N.F.
Altica ambiens	alder flea beetle	WA	Trinity & Shasta	Defoliated alder on Willow Creek, Grass Valley Creek, Coffee Creek, and Trinity Lake.
		AL	Eldorado	Small number of trees on private land.
?Bucculatrix albertiella	Oak ribbed-case maker	QD	Nevada	Leaf skeletonizer.
Calophya schini	Peppertree psyllid	AM	Contra Costa	CDF&A report
Cleridae	Checkered beetles	PP	Tuolumne	Common bark beetle predators.
Collops sp.	A soft-winged flower beetle	DF	Humboldt	Found under bark of dead saplings, probably secondary.
Cylindrocopturus eatoni and C. furnissi	Reproduction weevils	PP, DF	Butte	Both species appeared in a mixed, 5-6 year old plantation.
C. eatoni	Reproduction weevils	PP	Trinity	Plantation
C. furnissi		DF	Sonoma	Christmas trees.
Cynipidae	Cynipid gall wasp	QA	Calaveras	Injury to foliage.
		QW	El Dorado	Injury to foliage.
Dioryctria sp.	A pyralid moth	DF	Butte	Christmas trees
Halisodota argentata	Silverspotted tiger moth	WF	Tehama	Defoliated 0.5 to 1 acre on Croney Ridge.
		PP	Trinity	Incidental collection from plantation tree.
Neodiprion sp.	Pine sawfly	PP	Lake	Sapling trees.
Neophyllura arbuti	Madrone psyllid	MA	El Dorado	Most were parasitized.
Nuculaspis californica	Black pineleaf scale	BP	Santa Barbara	Vandenburg AF Base

TABLE IV. (Cont.)

INSECTS			WHERE EXAMINED OR REPORTED	
Scientific Name	Common Name	Host	County	Remarks
Otiorhynchus sulcatus	Black vine weevil	DF	Humboldt	In 2-0 Douglas-fir beds
Platynota stultana	Omnivorus leafroller	DF, PP GS	Butte	Present at Chico Tree Improvement Center.
Pseudopityoph-thorus pubipennis	Western oak bark beetle	OA	Riverside & San Diego	Widespread in oak stands
?Puto cupressi	Fir mealybug	DF	Tuolumne	On plantation saplings.
Scolytus praeceps	A Scolytus bark beetle	DF	Butte	Christmas tree plantation
Scythropus sp.	A pine needle weevil	PP, JP	Placer & Riverside	Light damage in plantations.
Steremnius sp.	A root-collar weevil	PP	Shasta	Very minor damage.
Stomacoccus platani	Sycamore scale	PA PO	Marin San Mateo	CDF&A Report CDF&A Report
Trisetaeus ehmanni	Pine bud mite	SP	Lassen	Only a few trees involved.
Unknown	Cutworm	DF	Humboldt	Damage limited and scattered in 2-0 Douglas-fir
Unknown	Leafhopper	BM	Shasta, Siskiyou, & Trinity	Leafhopper abundance associated with severity of leaf scorch.
Unknown	Scale	MA	Amador	Widespread on host within the mixed conifer type.
Xanthogaleruca luteola	Elm leaf beetle	HW	Plumas	Residential trees.
Xylotrechus nauticus	Oak cordwood borer	OA	Mariposa	Very common on a residential property, abundance probably was related to drought stress.

HOST ABBREVIATIONS

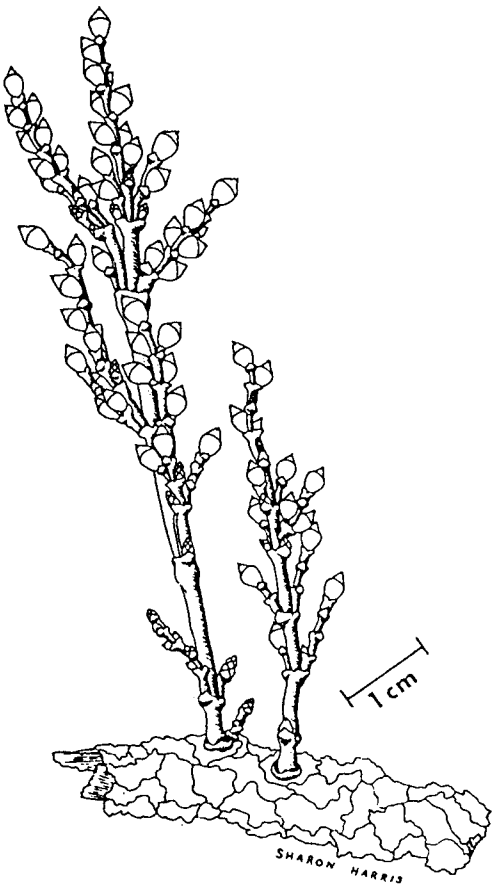
AL = Alder
BS = Brewer spruce
DF = Douglas-fir
GS = Giant sequoia
JP = Jeffrey pine
OA = Oak
PO = American plane
QA = Coast live oak
QW = Interior live oak
SP = Sugar pine
WF = White fir

BP = Bishop pine
BM = Bigleaf maple
EU = Eucalyptus spp.
HW = Hardwood
MA = Pacific madrone
PA = London plane
PP = Ponderosa pine
QD = Blue oak
SM = Peppertree
WA = White alder

Figure 3. Attendees at the insect field committee meeting discuss baiting with bark beetle pheromones to protect leave trees from successful attack by bark beetles, Roseburg Resources, Shasta County, May 23, 1990.

STATUS AND CONTROL OF DISEASES

A Report to the California Forest Pest Council from the Disease Committee



Melissa Marosy, Chair
Tim Tidwell, Secretary

Edited by Susan Frankel
December 14, 1990

STATUS AND CONTROL OF DISEASES

ABIOTIC DISEASES.

More than seven million trees of commercial size have died in California during the current drought. Although mortality generally was scattered as individual trees or small groups, extensive mortality areas sometimes extended to 150 acres. In the Tahoe Basin, 800,000 trees, or one of every five, have died. Tree mortality occurred throughout Southern California forests. Exceptionally high levels of mortality were found in the Mt. Palomar, Lost Valley, and Julian areas of San Diego County.

California experienced exceptionally cold temperatures during late December, 1990. Damage to native vegetation should be minimal unless planted well out of the native range. However, exotic vegetation was severely affected in some locations. It will be spring before the impact can be fully determined.

AIR POLLUTION. The amount of visible foliar ozone injury to pines in the southern Sierra Nevada has decreased over the last 4 years. This coincides with a period of drought stress which may cause ponderosa and Jeffrey pines to reduce their photosynthetic activity and take up less ozone. Between 1986 and 1990 the following changes in foliar injury were recorded for 27 sites on the Sequoia National Forest (Fresno, Tulare, and Kern Counties): 63% experienced reduced injury, 22% experienced increased injury, and 15% remained unchanged.

FOLIAGE DISEASES. Oaks in Trinity and Siskiyou counties were affected by Septoria leaf spot. California black oaks were partially defoliated by Septoria dryina in many areas, but especially along the Klamath and Trinity Rivers and around Clair Engle Lake. Oregon white oaks in Hayfork Valley (Trinity County) were severely affected by an undetermined species of Septoria. The increased amount of leaf spotting in the two county area was likely caused by significant rainfall in May, 1990.

Stigmina thujina was identified from Port-Orford-cedar on French Hill, Gasquet Ranger District, Six Rivers National Forest (Del Norte County). This is the first record of the disease on Port-Orford-cedar within its native range.

There has been little change in the incidence of other conifer foliage diseases. Elytroderma deformans caused highly visible damage along certain roadsides and Rock Creek on the Minarets Ranger District, Sierra National Forest (Madera County). Rhabdocline spp. on Douglas-fir and Scirrhia pini and Naemacyclus sp. on Monterey pine were incidental. Incidence of Phaeocryptopus gaumanni on Douglas-fir near Arcata (Humboldt County) has subsided.

Infestations by Cercosporella trichophila initiated premature defoliation of Oregon ash in the Coffee Creek area of Trinity County.

Maple tar spot (Rhytisma acerinum) infected maple along Rock Creek Nature Trail (Nevada County). This fungus causes a rather showy, but harmless spot on maple leaves.

NURSERY DISEASES. Disease problems at Humboldt Nursery (Humboldt County) included: Sirococcus strobilinus, a cause of tip blight, deformed and killed 1-0 Jeffrey pine; gray mold, caused by Botrytis sp., produced tip dieback of redwood seedlings and loss of lower needles in Douglas-fir; cedar leaf blight, caused by Didymascella (Keithia) thujina, was responsible for foliage loss and mortality of 2-0 western red cedar; and Septoria sp. caused a leaf spot of red alder. Powdery mildew defoliated 10,000 bigleaf maple seedlings. Two thousand white alder seedlings were infected with a rust, most likely Melampsoridium alni. Dothistroma pini, the cause of red band needle blight, attacked approximately 1,000 1-1 ponderosa pine seedlings.

At Placerville Nursery (El Dorado County), Fusarium spp. caused scattered mortality and chlorosis of 1-0 Jeffrey pine. Seedlings were predisposed to disease by overfertilization and hot weather. Sun scorch caused damage to lower needles and scattered mortality of 1-0 Jeffery pine.

At Magalia Nursery (Butte County), Fusarium spp. continued to kill 30 to 40% of the sugar pine, red fir, and white fir in unfumigated areas. Mortality was between 5 and 10% on fumigated and experimentally treated soils. Charcoal root disease (caused by Macrophomina phaseolina), a new disease at this nursery, was found on giant sequoia (Sequoiadendron giganteum).

Fusarium spp. caused mortality in 1-0 Douglas-fir at the Chico Tree Improvement Center (Butte County). Losses due to Fusarium spp. and other unknown causes were sustained in 1-0 ponderosa pine, 1-0 sugar pine, 2-0 sugar pine, and 2-0 Douglas-fir. Gray mold damaged 1-0 giant sequoia, but mortality was limited by fungicide treatment. Botrytis sp. also damaged coastal redwood at the L.A. Moran Reforestation Center (Yolo County).

Phoma sp. caused mortality in giant sequoia and white fir at Ben Lomond State Forest Nursery (Santa Cruz County). Phytophthora spp. also caused minor losses of white fir.

ROOT DISEASES.

Black Stain Root Disease (caused by Leptographium wageneri). Stands of ponderosa pine near Pondosa (Siskiyou County) were reported to have black stain infection centers. Near Viola, Shasta County, approximately 30 infected ponderosa pine trees were scattered across 2 acres of private land. An additional center in Shasta County was located in a ponderosa pine stand just west of Day Road and Big Valley Mountain. North of Covelo, in northeastern Mendocino County, black stain was seen in ponderosa pine, the first find of black stain in pine in Mendocino County.

Several Douglas-fir plantations on the Mad River and Orleans Ranger Districts, Six Rivers National Forest (Humboldt and Trinity counties) also had infection centers. Many scattered Douglas-fir near Ruth Reservoir, Trinity Co., were declining from black stain root disease. A few of these trees were attacked by the Douglas-fir beetle. Concern continued about this disease in Douglas-fir and its relationship to precommercial thinning.

Port-Orford-cedar Root Disease (caused by Phytophthora lateralis). In California, Port-Orford-cedar root disease remains limited to the Smith River drainage (Del Norte county) and a few small infections on the Siskiyou National Forest. A new infection area was identified near Baker Flat where a timber

sale is being considered on the Gasquet Ranger District. An eradication attempt on a tributary to the Middle Fork of the Smith River near Sanger Peak, Gasquet Ranger District, appears to be successful thus far. No infected trees were observed downstream 20 months after the operation. Dead and dying Port-Orford-cedars near Cedar Camp, Ukonom Ranger District, Klamath National Forest (Siskiyou County) were infested with Phloeosinus bark beetles, but were not infected with Port-Orford-cedar root disease. Phytophthora lateralis was isolated from discolored stem tissues of Pacific yew on the Gasquet Ranger District. This is the first report of Phytophthora lateralis on Pacific yew. Tests to determine the degree of susceptibility of this tree species to the fungus are in progress.

Annosus Root Disease (caused by Heterobasidion annosum). Annosus root disease killed ponderosa pines in the Summit progeny test plantation, Hat Creek Ranger District, Lassen National Forest (Shasta County). This plantation was planted in 1985 after the site had been harvested and prepared for planting. Site preparation included stump removal. A group of about 12 ponderosa pines was observed to be infected and dying. Small pieces of root material from the previous stand were found in the soil where mortality was occurring. Annosus root disease also caused mortality of giant sequoia (40 ft, 12-16" dbh) on property of the Saint Germain Foundation in Dunsmuir (Siskiyou County). Several adjacent, row-planted incense-cedars had been killed in previous years, and it appeared the fungus was spreading underground through root contacts. This root disease also occurs in scattered locations on McCloud Flats (Siskiyou County).

Annosus root disease contributed to windthrow scattered over 40 acres of mixed-conifer type on the Downieville District, Tahoe National Forest (Sierra County) at a rate of 6 to 12 trees per acre. Infected trees often hosted Armillaria root disease and the fir engraver, but these pests were secondary. Annosus root disease continued to predispose grand fir to attack by the fir engraver beetle in the North Fork Big River area of Jackson Demonstration State Forest (Mendocino County).

A 50-foot strip was cleared of all host trees around the perimeter of a very large annosus root disease center on the Mammoth Ranger District, Inyo National Forest (Mono County). The project was an attempt to stop the spread of root disease into a pure stand of Jeffrey pine in the pole and small sawtimber size classes. All stumps were treated with borax.

An incidence survey for annosus root disease was completed in 5 eastside pine type timber sale areas on the Mono Lake Ranger District, Inyo National Forest (Mono County). The survey focused on finding conks in stumps to determine infection frequency. No root disease was found in one area that was pure lodgepole pine. Stump infection varied from 27% to 50% in the other four areas that were predominantly Jeffrey pine. All of the sites had been logged at least 10 years previously.

Damage from this disease continued to contribute to mortality of conifers on the San Bernardino National Forest in Southern California. The disease was confirmed as the agent responsible for the mortality of a small population of giant sequoia trees in the vicinity of Snow Valley Ski Area. Other plantations of sequoia are being monitored.

Armillaria Root Disease (caused by Armillaria sp.). Armillaria killed several sugar pine saplings at Boggs Mountain Demonstration State Forest (Lake

County). The surrounding ponderosa pine saplings were not affected. A group of several tanoaks and one large Douglas-fir were killed by this root disease at the Mt. Hermon Conference Center near Felton (Santa Cruz County).

Laminated Root Disease (caused by Phellinus weirii). This root disease was identified near the Boulder Creek Trailhead, Scott River Ranger District, Klamath National Forest (Siskiyou County). An opening of two to three acres has been created in this white fir/Douglas-fir stand. Additional scattered mortality and windthrow also are present in the stand.

CANKER DISEASES. Pitch canker, caused by Fusarium subglutinans, continues to infect Monterey pine in both Santa Cruz County and Alameda County. Some of the moderately to heavily infected trees were killed by pine engraver beetle and/or red turpentine beetles. Pitch canker has now spread one to two miles northward of the Santa Cruz city limits along Highway 1. Pitch canker also appears to be intensifying in the Watsonville area (Santa Cruz County) according to the local Farm Advisor. Detections in other south bay area counties are unchanged.

Pitch canker was reported on planted ponderosa pine near Cabrillo College (Santa Cruz County). This is the first report of pitch canker on ponderosa pine in California. Pitch canker was also seen on planted Coulter pine in Monterey County.

Pitch canker research at the University of California, Berkeley indicates that pitch canker appears to be intensifying in the Santa Cruz area (M.E. Schultz, T.R. Gorden, and A.H. McCain, personal communication). Their findings are based on pruning studies. One hundred new infections were identified on trees in which all observable infections had been removed the previous season. The complete epidemiology of pitch canker is not understood and it is unknown if these infections were undetected prior to pruning, or if they occurred in 1990.

Cypress canker, caused by Seridium cardinale, was noted in one ornamental redwood in Ukiah, and in a few drought-stressed Monterey cypress near Hopland (Mendocino County).

Although sampling of branch flags on oaks was limited, oak branch dieback, caused by Diplodia quercina, apparently intensified on coast live oak throughout most of California. The oak pit scale occurred in conjunction with these infections.

Madrone canker, caused by Fusicoccum aesculi, (teleomorph = Botrysphaeria dothidea) was prevalent in most counties in Northwestern California.

Branch and stem infections caused by Botryosphaeria ribis continue to kill branches and tops of giant sequoia planted on dry sites at low elevation. Infections have been noted in Napa, Sonoma, Mendocino, and Humboldt Counties. The fungus is also contributing to decline of chaparral species including manazanita, ceanothus, and Tecate cypress in Riverside and San Diego Counties. The plants are predisposed to fungal infection by drought, air pollution, and other undetermined environmental stresses. The dead brush plants pose a severe fire hazard.

DWARF MISTLETOES, Arceuthobium spp. The abundance and distribution of dwarf mistletoes change only gradually over time. Nevertheless, dwarf mistletoes are

frequently factors that lead to decline and mortality of infected trees. Such was the situation in 1990 when mortality and abundant branch flagging occurred throughout the central and southern Sierra Nevada on red fir and white fir infected with dwarf mistletoe. Drought stress, attacks by Scolytus bark beetles, and infections of Cytospora abietis (the cause of cytospora canker) were contributing factors.

Brewer spruce near Baldy Mountain, Happy Camp Ranger District, Klamath National Forest (Siskiyou County) were heavily broomed by dwarf mistletoe, probably white fir dwarf mistletoe (Arceuthobium abietinum f.sp. concoloris). Also on the Happy Camp Ranger District, Douglas-fir dwarf mistletoe, Arceuthobium douglasii, and white fir dwarf mistletoe are adversely impacting stands in Doolittle Creek drainage.

Western dwarf mistletoe (Arceuthobium campylopodum) was associated with mortality of ponderosa pine on the Covelo Ranger District, Mendocino National Forest (Mendocino County). Western dwarf mistletoe continued to spread slowly in ponderosa pine at Boggs Mountain Demonstration State Forest (Lake County).

Efforts to survey National Forest lands infested with dwarf mistletoe were intensified in 1990. Pre-suppression surveys were conducted on over 6000 acres on the Angeles, Cleveland, Inyo, Los Padres, Mendocino, Plumas, and San Bernardino National Forests, with plans to survey an additional 2300 acres on the Angeles, Cleveland, Klamath, Inyo, Los Padres and Mendocino National Forests in 1991. Treatment of over 6500 acres on the Angeles, Cleveland, Plumas, and San Bernardino National Forests is planned for 1991.

A dwarf mistletoe suppression project was implemented on Newhouse Ridge, Covelo Ranger District, Mendocino National Forest (Mendocino County). The objective was to protect a 40-acre plantation of ponderosa pine from infection by an overstory source of western dwarf mistletoe. Pheromones of the western pine beetle (Dendroctonus brevicomis) were applied to target trees to attract tree-killing insects in order to kill the infected overstory pines. Any trees not successfully attacked and killed will be either girdled or felled in 1991.

A dwarf mistletoe pre-suppression survey was conducted in Twin Lakes Campground, on the Mammoth Ranger District, Inyo National Forest (Mono Co.). Data collected from the 34-acre campground will be used to decide which treatment or combination of treatments are feasible for the heavily infected site. If a control project develops, it will be the first suppression project that targets lodgepole pine dwarf mistletoe in California.

RUST DISEASES. White pine blister rust (caused by Cronartium ribicola) continued to affect sugar pine in California. As efforts to identify and protect resistant sugar pines accelerate, one of the six known homozygous resistant trees in the state succumbed to attack by the mountain pine beetle (Dendroctonous ponderosae) in September. The tree's genotype was preserved by grafting. Other resistant trees on the Stanislaus and Sequoia National Forests have been attacked by bark beetles and are fading.

Thirty-six sugar pines resistant to white pine blister rust have been identified in the southern Sierras on Mountain Home Demonstration State Forest. Three are homozygous (RR), while the remainder are heterozygous (Rr) for major gene resistance (MGR). A total of 161 sugar pines (known resistant

and candidates) were sprayed twice with carbaryl (Sevin 80S) in 1990 to protect against attack by red turpentine and mountain pine beetles.

Eleven heterozygous resistant sugar pine have been identified in the northern Sierras on Latour Demonstration State Forest. A total of 136 trees (known resistant and candidates) were treated once in 1990. No protected trees have been killed in either forest by bark beetles since spraying was first begun in April of 1989.

Five white pine blister rust resistant sugar pines on the Mendocino National Forest were sprayed with carbaryl to protect them against attack by mountain pine beetle and red turpentine beetle.

White pine blister rust caused increased levels of branch flagging of sugar pine on Mt. Sanhedrin, Lake County. Areas of infection appeared in or near areas burned in the 1987 Mendenhall fire. Growth and abundance of alternate hosts (Ribes spp.) of the fungus have increased in the area since the fire.

Western gall rust, caused by Peridermium harknessii, degraded ornamental plantings of Monterey pine and native stands of knobcone pine in Sonoma County. Branch mortality and stem cankers occur in these and several other pine species.

Minor Rust Diseases. Several lesser-known rust diseases were reported in 1990. Fir-fireweed rust caused necrosis of current year white fir needles on more than 100 trees on private forest lands in Siskiyou County. Pucciniastrum epilobii causes the rust. Melampsorella caryophyllacearum, which causes yellow witches broom of true fir, infected 5 to 10 trees per acre on 26 acres of the Sierraville District, Tahoe National Forest (Sierra County).

Douglas-fir rust, caused by Melampsora medusae, was found on saplings on private land near Quincy (Plumas County). The alternate hosts of this rust are cottonwood or poplar. The rust causes needle necrosis and discoloration, which usually results in minor damage. Blueberry rust, caused by Pucciniastrum goeppertianum, infected and ruined several hundred white fir Christmas trees west of Willits, Mendocino County. The alternate host in the vicinity is black huckleberry.

DUTCH ELM DISEASE. Dutch elm disease, caused by Ceratocystis ulmi, has expanded into the Central Valley of California. Five trees were confirmed from Isleton, a town 30 miles south of Sacramento. Subsequently, five infected trees have been confirmed in the city of Sacramento, which has a street elm population of 17,500. These are the first diseased elms reported in Sacramento County. A quarantine has been established in portions of Sacramento, San Joaquin, and Yolo Counties. (See Surveys and Evaluations, p. 43)

TABLE V. FOREST DISEASES REPORTED - 1990[a]

AGENT	HOST	COUNTY
ABIOTIC INJURIES		
Air pollution	JP	Kern, Fresno, Tahoe
Drought	All species	Statewide
FOLIAGE DISEASES		
Cercosporella trichophila	FL	Trinity
Elytroderma deformans	PP, JP	Statewide
Maple scorch	BM	Trinity, Shasta, Siskiyou
Naemacyclus sp.	MP	Host Range
Phaeocryptopus gaumanni	DF	Humboldt
Rhabdocline pseudotsugae	DF	Mendocino
Rhytisma acerinum	BM	Nevada
Scirrhia pini	MP	Mendocino
Septoria sp.	OA	Trinity County
Stigmina thujina	POC	Del Norte
NURSERY DISEASES		
Botrytis sp.	DF, RF, WH	Humboldt
	GS	Butte
	RW	Yolo, Humboldt
Didymascella (Keithia) thujina	WRC	Humboldt
Dothistroma pini	WWP, PP	Humboldt
Fusarium sp.	DF, PP	Butte
	WF	Humboldt, El Dorado, Butte
	RF	El Dorado, Butte
	SP	Butte, El Dorado, Santa Cruz

TABLE V. (Cont.)

AGENT	HOST	COUNTY
NURSERY DISEASES		
Melampsoridium alni	WA	Humboldt
Phoma sp.	DF	Humboldt
	SG, WF	Santa Cruz
Phomopsis sp.	DF	Humboldt
Phytophthora sp.	WF	Santa Cruz
Powdery mildew	BM	Humboldt
Septoria sp.	AL	Humboldt
Sirococcus sp.	JP	Humboldt
Sun scorch	JP	El Dorado
ROOT DISEASES		
Armillaria sp.	SP	Lake
	DF, TO	Santa Cruz
Heterobasidion annosum	WF	Sierra, Plumas
	GF	Mendocino
	PP	Shasta
	GS	Siskiyou
Leptographium wageneri	PP	Shasta, Mendocino, Siskiyou
	DF	Trinity, Humboldt, Mendocino
Phellinus weirii	DF, WF	Humboldt, Siskiyou
Phytophthora lateralis	POC	Del Norte
	PY	Del Norte
CANKER DISEASES		
Botryosphaeria ribis	GS	Sonoma, Napa, Mendocino, Humboldt
	Chapparal	Riverside, San Diego.

TABLE V. (Cont.)

AGENT	HOST	COUNTY
CANKER DISEASES		
Cytospora abietis	RF	Host range
Fusarium subglutinans	MP	Alameda, Monterey, Los Angeles, San Benito, San Diego, San Francisco, San Luis Obispo, Santa Barbara, Santa Cruz.
	PP	Santa Cruz.
	CP	Monterey.
Fusicoccum aesculi	MA	Humboldt, Sonoma, Mendocino
Seridium cardinale	RW, MC	Mendocino
PARASITIC PLANTS		
Arceuthobium spp.	WF	Plumas, Siskiyou
	PP	Lake
	BS	Siskiyou
	RF	Host range
	DF	Siskiyou
Phoradendron sp.	WF	San Bernardino
RUST DISEASES		
Cronartium ribicola	SP	Lake
Melampsora medusae	DF	Plumas
Melampsorella caryophyllacearum	RF	Sierra
Peridermium harknessii	MP	Humboldt
	KP	Sonoma
Pucciniastrum epilobii	WF	Siskiyou
Pucciniastrum goeppertianum	WF	Mendocino

a. Not a complete listing for all locations reported, nor for reports of common diseases.

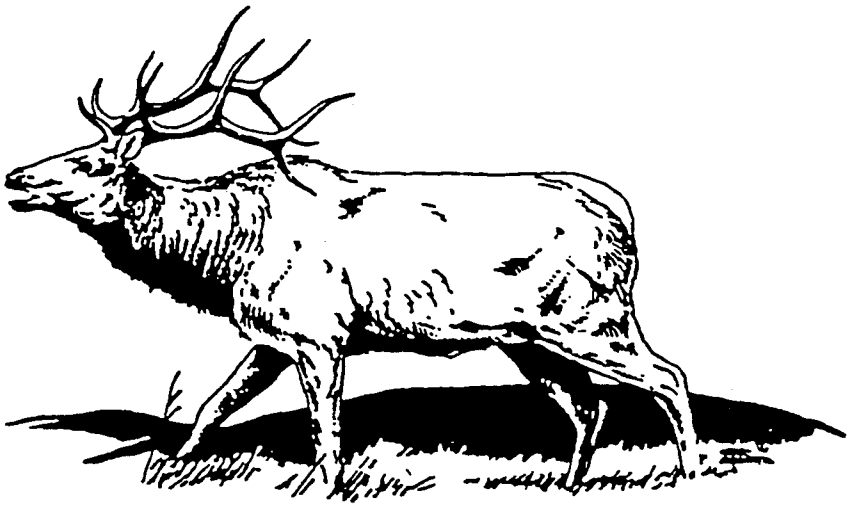
HOST ABBREVIATIONS

AL = Alder
BM = Bigleaf maple
CN = Conifer
DF = Douglas-fir
FV = Modesto ash
GS = Giant sequoia
IC = Incense-cedar
KP = Knobcone pine
MA = Pacific madrone
PC = Pear
POC = Port-Orford-cedar
PY = Pacific yew
RF = Red fir
SP = Sugar pine
TO = Tan oak
WF = White fir
WRC = Western red cedar

BS = Brewer spruce
BP = Bishop pine
CP = Coulter pine
FL = Oregon ash
GF = Grand fir
HW = Hardwoods
JP = Jeffrey pine
LP = Lodgepole pine
MP = Monterey pine
PM = Pinyon pine
PP = Ponderosa pine
DP = Digger pine
RW = Redwood
TF = True firs
WA = White alder
WJ = Western juniper
WWP = Western white pine

STATUS AND CONTROL OF ANIMAL PESTS

A Report to the California Forest Pest Council from the Animal Damage Committee



Gregory A. Giusti, Chair
Robert Schmidt, Secretary

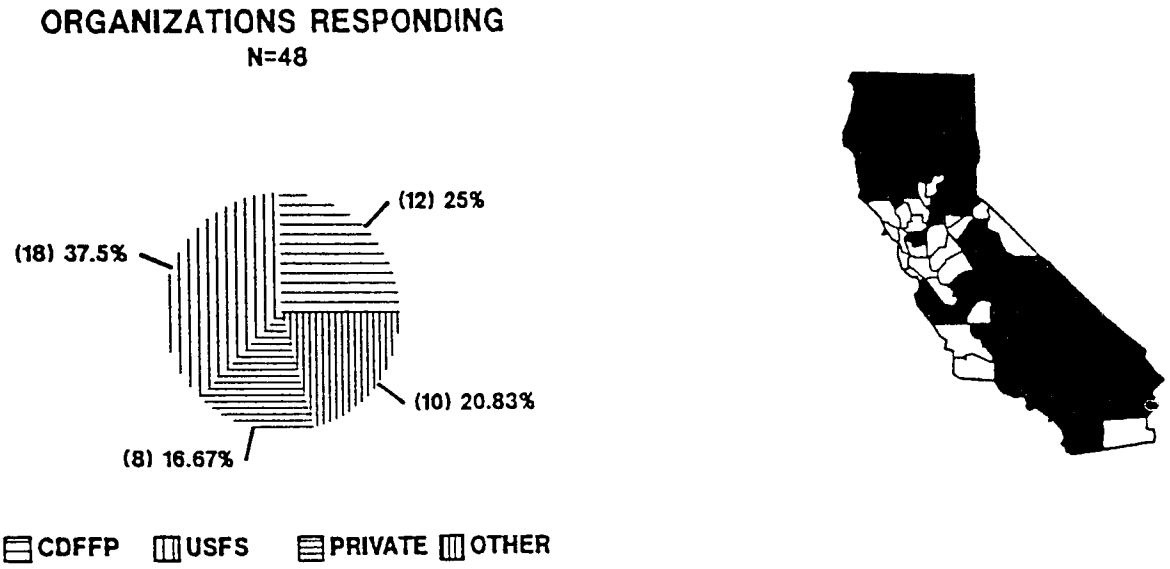
Report Compiled by: John E. Borrecco
Edited by Gregory A. Giusti
December 28, 1990

INTRODUCTION

This report summarizes the Animal Damage Committee's survey of vertebrate damage of forest trees sent out as part of the California Forest Pest Council's annual overview of pest conditions in California. In August 1990, 156 survey forms were mailed to federal, state, and private foresters, forest companies and other agencies throughout California. A total of 48 (30%) responded from 33 counties and are included in this analysis.

RESPONDENTS AND LOCATION OF REPORTS

Surveys were returned by representatives of the U.S. Forest Service (n=18), California Department of Forestry and Fire Protection (n=12), private timber companies (n=8), and other organizations (n=10); these include the Bureau of Land Management (4), National Park Service (3), California Department of Parks and Recreation (1), University of California Cooperative Extension (1), and the Nature Conservancy (1) (Figure 4). Counties represented by the returned reports cover approximately 3/4 of the land area of California. These include: Butte, Colusa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Inyo, Kern, Lake, Lassen, Los Angeles, Madera, Mariposa, Mendocino, Modoc, Monterey, San Bernadino, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, Tulare, and Ventura (Figure 5).



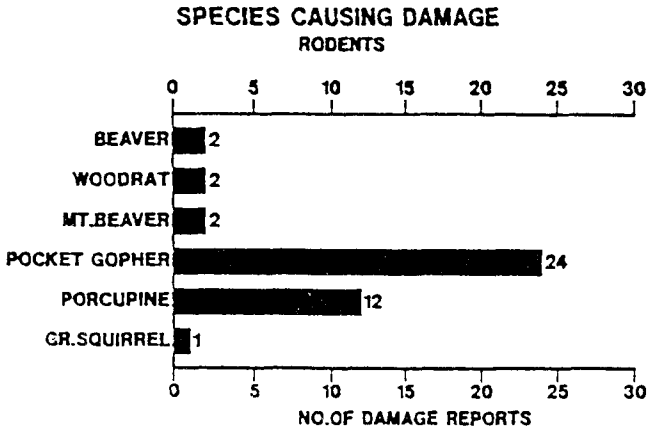
Figures 4 & 5. 4, Organizations responding to the Animal Damage Committee's survey of vertebrate damage of forest trees in 1990; 5, California counties represented by returned reports.

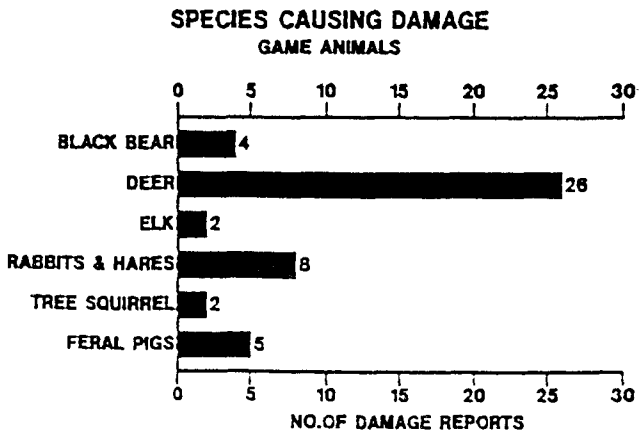
SPECIES CAUSING DAMAGE

A variety of mammal species caused damage to forest trees, and the damage varies by area and agency. The majority of repondents reported damage from deer, pocket gopher, porcupine, rabbit, and domestic stock. No damage was reported for birds, and other "mice" (which may include shrews) (Table VI,Figures 6 & 7).

Table VI. Number of Respondents Reporting Damage. (n = 48)

Species	USFS	CDFFP	Private	Other	Total
Beaver	1	0	0	1	2
Birds	0	0	0	0	0
Black Bear	0	7	2	0	9
Deer	13	9	5	4	31
Dusky-footed Woodrat	0	2	2	0	4
Elk	1	1	1	0	2
Meadow Mice	0	1	0	0	1
Mt. Beaver	1	3	0	0	4
Pocket Gopher	15	5	6	1	27
Porcupine	6	5	2	1	14
Rabbit	6	2	0	2	10
Tree Squirrels	0	2	0	0	2
Domestic Stock	10	5	3	1	18
Ground Squirrel	1	1	0	0	2
Feral Pigs	0	0	0	2	2
Total Reports	53	43	19	12	126



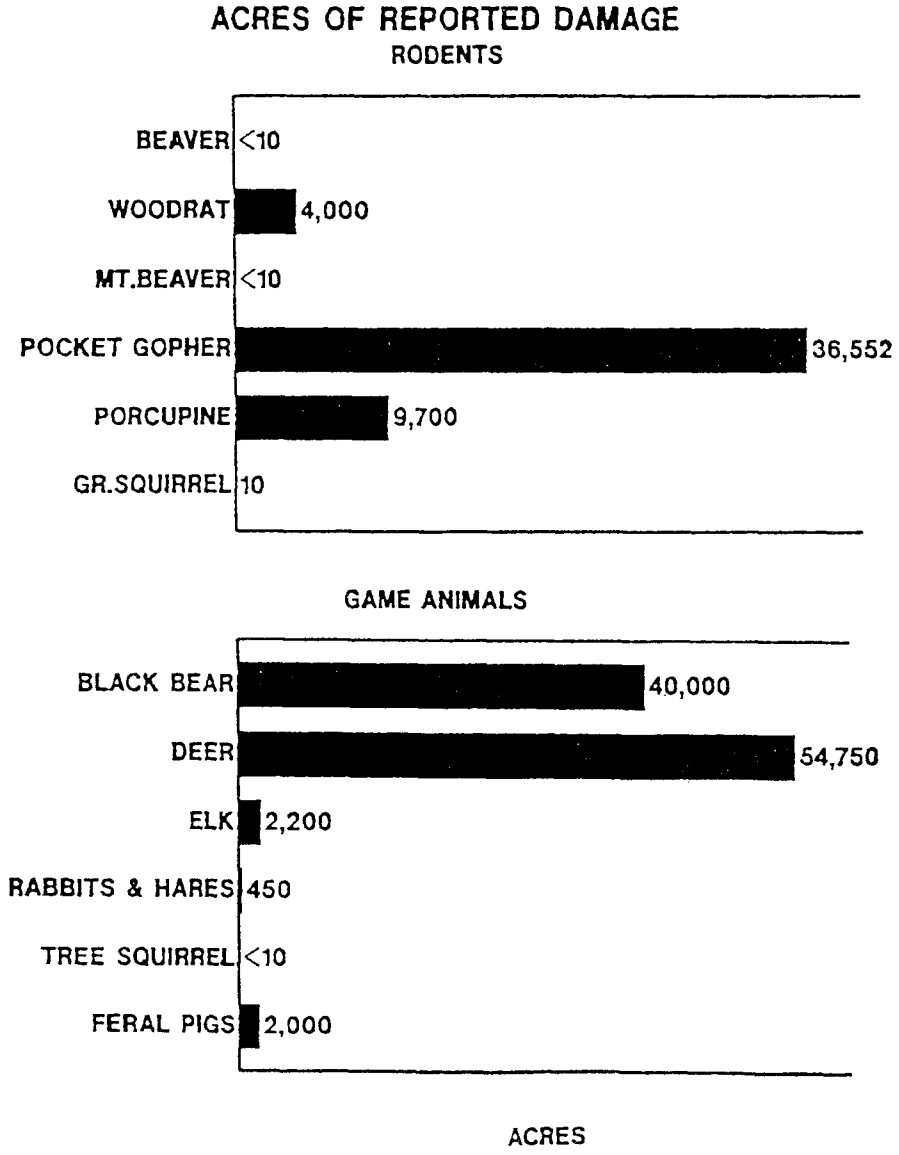


Figures 6 & 7. Species causing damage as reported in the Animal Damage Committee's survey of vertebrate damage of forest trees in 1990; 6, rodents; 7, game animals.

SCOPE OF DAMAGE

Damage from all sources was reported on land in excess of 155,000 acres. All of California's major timber producing regions and timber types have reported damage caused by vertebrate species. In several cases respondents indicated that injury from vertebrates occurred, but not at levels sufficient to justify the amount of time and effort to quantify the data.

In many cases respondents reported damage from multiple species of vertebrates that requires highly variable approaches to minimize damage. Figures 8 and 9 demonstrate the scope of the damage being caused. Species are divided into game animals and non-game groups (rodents) in order to easily distinguish the control and management options available to the practicing forest manager.



Figures 8 & 9. Acres of damage reported to the Animal Damage Committee's survey of vertebrate damage of forest trees in 1990; 8, rodents; 9, game animals.

ANIMAL DAMAGE TRENDS BY FOREST TYPE

Redwood - Douglas-fir Type. Vertebrate species represent the largest, single pest problem in the redwood/Douglas-fir forest type. In terms of geographic locations this type is restricted to the northern coastal counties of California. The counties of Del Norte, Humboldt, and Mendocino have all reported stable to increasing problems with black bear, black-tailed deer, dusky-footed woodrat, elk, mountain beaver, and tree squirrels.

The primary species of concern, black bear, deer, elk, and tree squirrels, are all classified as game animals by the California Department of Fish and Game. Because of game status, management options are highly restricted and must often be implemented during times of regularly scheduled hunting seasons, precluding the need to time control or management options to times when these may be most effective.

The dusky-footed woodrat often can cause severe damage in localized areas. As with most rodents, the damage is characterized by gnawing of the bark and feeding on the cambial layer. Private timber companies reported a total of 4,000 acres impacted by this species in 1990. In light of newly enacted regulations regarding the spotted owl, control options for woodrats are uncertain at this time. The woodrat is considered a preferred food species for the owl. This designation will certainly affect future control strategies.

True Fir Forest Type. Respondents to this years survey were of the opinion that damage from vertebrate pests was generally on the increase. Species of greatest concern were deer, pocket gopher, porcupine, rabbits and hares, and domestic stock. In many cases respondents reported damage on more than a single tree species.

Species such as deer, pocket gophers and lagomorphs (rabbits and hares) impacted trees generally less than 10 year old. In many cases management options for protection of above ground tree parts favored the use of some type of exclusionary device, e.g. netting, shelters, and tubes. In selected cases forest personnel have relied on repellents to provide some level of control.

Pine Forest Type. This forest type suffered high levels of damage from both pocket gopher and porcupine. Recurring drought conditions throughout California appear to have benefitted both species by allowing populations to remain at relatively high numbers throughout the winter months. These species by far represent the greatest threat to plantations and natural stands of trees. In some areas plantations were replanted for three consecutive years because of repeated damage caused by pocket gophers. Damage from pocket gophers and porcupine were reported from the counties of: Butte, Colusa, El Dorado, Fresno, Glenn, Humboldt, Inyo, Kern, Lake, Lassen, Los Angeles, Madera, Mariposa, Mendocino, Modoc, Nevada, Orange, Placer, Plumas, Riverside, San Bernadino, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, and Tulare.

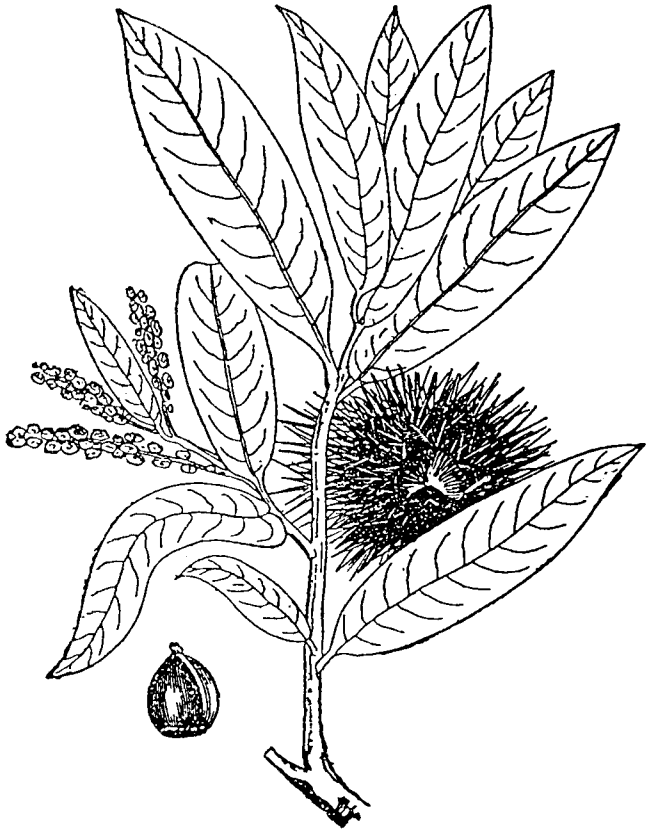
The other major vertebrate pest of this forest type is domestic livestock. This is a recurring problem and is often one of the most difficult to manage. Historical grazing patterns, large acreage allotments, and relatively light stocking densities all compound the problem. The most effective management option is total exclusion through fencing; 13% of those reporting livestock damage have used this approach. More forest managers are trying to implement forest grazing management strategies that minimize damage. This will probably increase due to the increasing costs associated with fence construction and

maintenance. Counties reporting damage from domestic stock were: Fresno, Inyo, Lassen, Madera, Mariposa, Modoc, Nevada, Orange, Placer, San Diego, Shasta, Sierra, Siskiyou, Tehama, Trinity, and Ventura.

Hardwood - Conifer Type. Reports of damage to oak (Quercus sp.) by feral pigs, ground squirrels, and domestic stock were given again in 1990. The impact was reported to be on regeneration efforts. This is only the second year that feral pigs have been reported in the survey. In 1989 damage reports were given from only two counties. In 1990 the number of counties reporting damage increased to five -- Kern, Monterey, Sacramento, San Benito, and Tehama. In all cases control was reported to be exclusionary fencing. In some cases managers are using direct methods of population reduction in conjunction with fencing to minimize damage.

STATUS AND CONTROL OF WEEDS

A Report to the California Forest Pest Council from the Weed Committee



Nelson Money, Chair
Glenn Lunak, Secretary

Edited by Glenn Lunak
December 14, 1990

STATUS AND CONTROL OF WEEDS

California continues to have a diverse problem with weed competition that affects the survival and growth of forest plantations in all forest types. Plant species creating competition are many and frequently include other conifers. The following list includes some of the most common:

annual grasses
bear clover
bigleaf maple
bitterbrush
bitter cherry
black oak
bracken fern
broadleaf herbs
canyon live oak
chinkapin
conifers
deerbrush
lupine
madrone
manzanita, nonsprouting
manzanita, sprouting
mountain whitethorn
oceanspray
perennial grasses
rabbitbrush
Ribes spp.
sagebrush
snowbrush
tanoak.

Insects infesting regeneration such as the gouty pitch midge, the pine needle sheathminer, and pine reproduction weevil find favorable hosts in pines under severe competition stress. Relief from the stress usually alleviates the insect problem.

The recent combination of drought and fire has created a serious problem with weed competition. Private land managers continue to use a spectrum of available herbicides to ensure successful regeneration; meanwhile the U.S. Forest Service has completed a seventh growing season without herbicides. Thus, a dramatic contrast can be seen in Tuolumne County where, after the 1987 Stanislaus Fire, private forest lands have been almost completely reforested while the Forest Service has had serious problems in establishing plantations. Resumption of the use of herbicides on the National Forests depends on resolution of the 22 appeals to the Vegetation Management Environmental Impact Statement. As of November 9, 21 of the 22 appeals have been processed by the Office of General Counsel in Washington, D.C.

The following herbicides were available for use in California forests during 1990: atrizine, glyphosate, hexazinone, triclopyr, and 2,4-D. Asulam, dichlorprop (2,4-DB), and picloram are no longer available for forest use.

KNOW YOUR FOREST PESTS

CALIFORNIA FLATHEADED BORER

The California flatheaded borer, Melanophila drummondii, is primarily a pest of weakened or stressed Jeffrey or ponderosa pines in most of California. More often than not, it is found in trees along with one or more bark beetle species -- the western pine beetle in ponderosa pine, the Jeffrey pine beetle in Jeffrey pine, and pine engravers and the red turpentine beetle in both hosts. Other tree species attacked are sugar, Coulter, Monterey, digger and knobcone pines.

In Southern California this insect is more aggressive and frequently kills pines in the absence of its fellow insect pests, and even without the frequently concomitent annosus root disease. Usually larger trees are attacked, but trees as small as saplings may be attacked. Attacks may occur over the entire tree, part of a tree, e.g. the top or mid-bole, or a strip on one side -- called a strip attack. Attacks on boles are usual, but tops and limbs may also be successfully colonized. Borers may continue their development in boles, tops and limbs when trees die or are felled and utilized.

Evidence of Attacks. When a tree dies from flathead attacks, crown fading is indistinguishable from the fading due to attacks by bark beetles. This seems only logical as both flatheads and bark beetles may be in the tree at any one time. Like bark beetles, the adults may have emerged before the foliage is noticeably changed in color. However, unlike bark beetles, the exit hole will be oval and small, not round and small.

Galleries of larger larvae wind through the inner-bark. Galleries are 3/8 to 5/8" wide (10-15 mm) and solidly packed with frass and borings, which are deposited in a clearly defined, crescent pattern (Fig. 10). Attacks may produce thin resin streams down the bole if the tree has some ability to resist. Trees under great stress do not produce streams for resin. Pitch tubes produced from attacks by bark beetles do not occur with attacks by the California flathead borer. Neither will you find boring dust caught in bark fissues as may occur with some bark beetles.

Life Stages. The adult beetle is a small elliptical, flat beetle -- somewhat boat-shaped when viewed from above, or a bit like a patch in plywood. It is black or near black above and may bear 1 to 3 yellow spots on each wing cover. However, many adults have no spots. The under side is a dark brassy green. Eggs are about 1 mm in size and difficult to locate.

Young larvae match the sapwood in color. The area behind the head is enlarged laterally, which gives larvae the characteristic of being shaped like a horseshoe nail (Fig. 10). In the last instar, prepupal stage, the larvae shortens, thickens, and the body is bent double within the pupal chamber. The pupa is a stage wherein the final transformation to an adult occurs. Wings, antennae, eyes, and other external body parts are visible at this stage.

Life Cycle. Adults emerge May to August. In Southern California one would assume early rather than later, but portions of the population may not be synchronized. Local weather may be influencial in timing from year to year.

When adults emerge they feed on foliage, which is necessary for the female to develop viable eggs. Damage to the foliage is seldom noticeable.

Eggs are placed under bark scales bordering on crevices. Hatch occurs in 1 to 3 weeks. The first instar larva mines directly into the cambium, turns horizontally, and mines at the phloem-xylem interface. These tiny mines heal if the larva dies or becomes an "incipient" larva. The result is a warty ridge on the xylem that will become encased if the tree continues to live.

Normally the life cycle completes within one year. However, larvae that become "incipient" may survive up to 4 years in this relatively inactive state. Mortality rates of these larvae are high and trees can be found that have survived numerous attacks indicated by the abundance of "warty" ridges.

However, should the host lose vigor for any reason, the incipient larvae are somehow stimulated to initiate normal growth and complete their life cycle. The result is a dead tree or a strip of dead bole. Thus, stress placed on a tree up to 4 years after the initial attacks may trigger tree death from an earlier flathead population residing under the bark in the incipient stage.

Year X	X+1	X+2	X+3	X+4
Drought, flathead attack	normal moisture	--------> -------->	Damage to roots or return of drought	Incipient or latent larvae complete life cycle, killing tree.

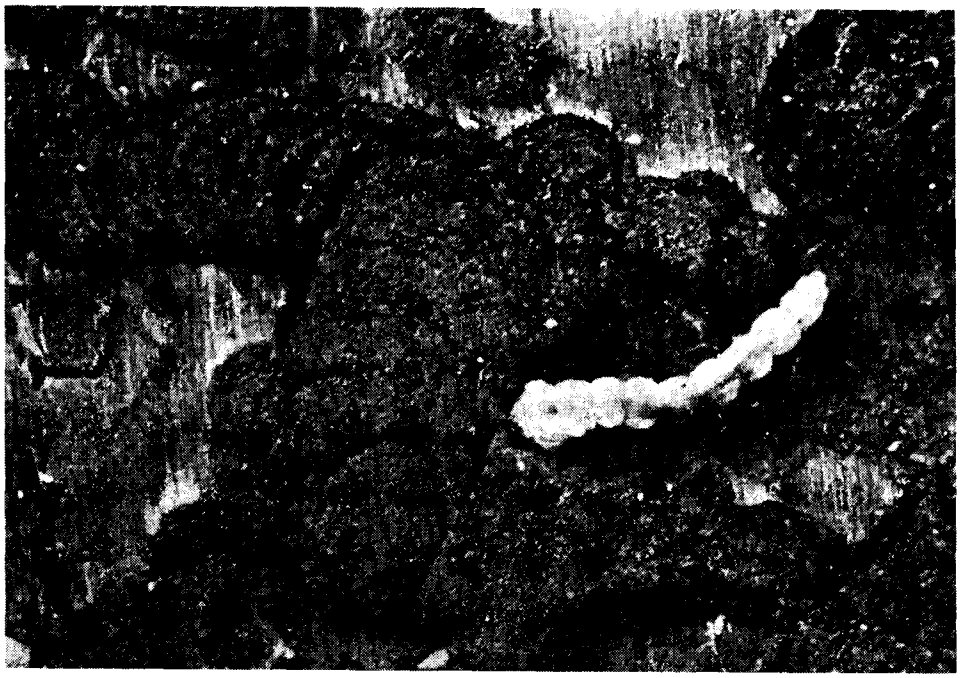


Figure 10. Larva and galleries of the California flatheaded borer.

Index of Previous Topics Utilized in **KNOW YOUR FOREST PESTS**.

YEAR	TOPIC	PAGE NO.
1990	CALIFORNIA FLATHEADED BORER	37
1989	None written	
1988	BLACK BEAR DAMAGE	30
1987	THE GOUTY PITCH MIDGE	20
1986	THE EUCALYPTUS BORER	22
1985	BRANCH AND TWIG DIEBACK OF OAKS	19
1984	GYPSY MOTH	20
1983	TANOAK	19
1982	WOOD RATS	17
1981	DUTCH ELM DISEASE	18
1980	PHYTOPHTHORA ROOT ROT OF PORT-ORFORD CEDAR	16
1979	TRUE MISTLETOE ON WHITE FIR	16
1978	MYCORRHIZAE	21
1977	FOMES ANNOSUS IN RED AND WHITE FIR	12
1976	NURSERY DISEASES	11
1975	CYTOSPORA CANKER OF TRUE FIRS	13
1974	SALT DAMAGE TO ROADSIDE CONIFERS	13
1973	BLACK STAIN ROOT DISEASE	13
1972	PHLOEM NECROSIS OF DOUGLAS FIR	14
1971	ELYTRODERMA NEEDLE DISEASE OF PINES	13
1970	FOMES ANNOSUS ROOT ROT	19

The State Conditions report is available at the following libraries:

LIBRARY/CITY	YEARS
California State Library, Govt. Publications Section, Sacramento	1946 to present
University of California - Berkeley	1946 to present
University of California - Los Angeles	1955 to present
University of California - Santa Barbara	1956 to present
University of California - Riverside	Sporatic years
University of California - Davis	Sporatic years
University of California - San Diego	Sporatic years
Stanford University, Palo Alto	Unknown
USDA Forest Service, Pacific Southwest Range and Experiment Station - Berkeley	1946 to present

SURVEYS AND EVALUATIONS

DEMONSTRATION THINNING PLOTS IN THE EASTSIDE PINE TYPE ON THE LASSEN NATIONAL FOREST. In 1978-1979 the Forest Service established plots in the eastside pine type to show the effects of thinning on pest-caused losses in areas of high tree mortality. The stands chosen were mostly pole-size ponderosa pine mixed with some white fir and incense-cedar, growing on medium to low sites, and ranging in age from 70 to 90 years. Within the demonstration plots, four levels of stocking density -- 40, 55, 70, and 100 percent of normal basal area -- were established to demonstrate the biological and economic alternatives available for management planning. (Normal basal area is the basal area that a stand should have reached when fully stocked with trees, which in the demonstration areas, ranges from 185 to 215 sq ft/ac, depending on site quality.) Ten years after thinning, the treatments had reduced mortality from 90 to 100 percent of the level in unthinned stands (Table VII).

TABLE VII. COMMERCIAL TREE MORTALITY BY STOCKING LEVEL, TEN YEARS AFTER THINNING[a]

Year	Residual Stocking After Thinning[b] 40%	55%	70%	100%
		Trees per Acre		
1980	0.0	0.2	0.2	2.4
1981	0.0	0.0	0.7	2.4
1982	0.0	0.5	0.3	3.6
1983	0.0	0.1	0.8	4.1
1984	0.0	0.0	0.0	1.0
1985	0.0	0.2	0.0	0.6
1986	0.0	0.0	0.0	1.3
1987	0.0	0.0	0.0	1.4
1988	0.0	0.0	0.0	0.0
1989	0.0	0.4	0.0	2.6
1990	0.0	0.0	0.0	2.6
Mean	0.0	0.1	0.2	2.0
Range	0	0-0.5	0-0.8	0.0-4.1
Percent Mortality Reduction Compared with Normal Basal Area	**100**	**95.0**	**90.0**	**---**

[a]Commercial trees are 8 inches dbh and larger, with straight boles, yielding at least one 10-foot log with a 6-inch top. Trees were killed by the mountain pine beetle.

[b]Percent of normal basal area.

TABLE VIII. ESTIMATED MORTALITY AND SALVAGE ON NATIONAL FORESTS IN CALIFORNIA TO JUNE 30, 1990[a]

National Forest	Est. Total Merchantable Dead Timber MMBF (1)	10 Yr Ave. Softwood Sell, 79-89 MMBF (2)	Salvage Target, FY-90 MMBF (3)	Salvage Sales, Vol. Estimate (MMBF)	
				Salvage Offer (4) (to 6/90)	Est. Offer (5) for FY90
Angeles	(*)		.4	(*)	(*)
Cleveland	(*)		.0	(*)	(*)
Eldorado	1000	129.9	145.0	154.45	250
Inyo	0.2	7.3	0	0	0
Klamath	59	176.8	106.7	54.89	37.5
Lassen	150	158.4	35.0	18.47	40.0
Los Padres	(*)		.1	(*)	(*)
Mendocino	15	79.2	30.0	0.986	10.0
Modoc	45	53.0	4.0	0	0
Plumas	300	178.6	10.0	38.29	120
San Bernardino	2.5		60.0	0	1.5
Sequoia	50	71.4	3.0	1.18	15
Shasta-Trinity	80	200.9	7.0	37.73	40
Sierra	150	118.9	57.0	27.59	50
Six Rivers	25	116.6	23.0	.37	10
Stanislaus	500	104.2	60.0	62.03	125
Tahoe	250	121.9	81.0	19.13	100
LTBMU	50	.7	18.0	2.88	20
Totals	2677	1514.6	640.2	417.98	810

[a]Timber Management Staff, Pacific SW Region, San Francisco, CA 94111.
(1) Total estimated mortality from CAS (Capable, Available, & Suitable) land due to the current drought (est. 6/29/90).
(2) Ten year average sell from CY-1979 through CY-1989 of softwoods (Source: cut and sold reports).
(3) Management attainment target 17.2 (Salvage Timber Offered, 1930 Feb. 1990).
(4) New salvage sales offered from PSTAR (Periodic Timber Accomplishment Report - STAR-based), 6/30/90.
(5) Salvage volume that could be offered or added to existing sales in FY90.
(*) Salvage volume included with San Bernadino NF estimates.

NEW DWARF MISTLETOES IN CALIFORNIA. Three new species and one new subspecies of dwarf mistletoe have been confirmed for California by Frank Hawksworth, Rocky Mountain Forest and Range Experiment Station, and Del Wiens, University of Utah. Two of the new species, Arceuthobium siskiyouense and A. monticola, occur in the Siskiyou-Klamath Mountain floristic province of northwestern California and Southwestern Oregon, an area well known for its high degree of plant endemism. The third species is A. littorum, and the subspecies is A. tsugense subsp. mertensianae.

Arceuthobium siskiyouense, a parasite of knobcone pine, was segregated from A. campylopodum, a widespread species that commonly occurs on ponderosa, Jeffrey, and other pines. A. monticola, a parasite of western white pine, was separated from A. californicum, which is now considered to be a California endemic essentially restricted to sugar pine. Arceuthobium littorum parasitizes Monterey and bishop pines in coastal California. It was formerly included under A. occidentale, which is now considered to be an interior species primarily parasitic on digger pine. The new subspecies, A. tsugense subsp. mertensianae, which infests only mountain hemlock, is distributed from southern British Columbia to the central Sierra Nevada Mountains in California. The coastal, typical phase found only on western hemlock, which is rare in northwest California, thus becomes A. tsugense subsp. tsugense.

ANNOSUS ROOT DISEASE CONTROL. Mechanical harvesting with various types of shearing equipment is increasing in areas of eastside pine. This forest type is known to have high levels of annosus root disease introduced into stands through pine stumps. Most timber sales in these areas use borax on stump surfaces to prevent infection by the causal fungus, Heterobasidion annosum. The granular borax registered for this use has limited solubility, and there is interest in finding a soluble material that might be applied by the equipment during shearing. This could reduce labor costs. Also, some of the shearing equipment causes uneven stump surfaces and fracturing of the stumps that cannot be effectively treated with granular borax. A material has been tested in the southeastern United States for this purpose and similar tests were performed in California. The material is known as TIM-BOR™ and is produced by US Borax for use as a wood preservative for the treatment of lumber.

Treatments were performed in two areas: (1) a timber sale on the McCloud Ranger District, Shasta-Trinity National Forests, with the use of a Temco Roto-saw, and (2) on the Devils Garden Ranger District, Modoc National Forest, with the use of a Hydro-Ax 711 shearhead. Both naturally and artificially inoculated stumps were treated. The following levels of stump infection occurred 8 weeks after treatment.

Treatment:	McCloud	Devils Garden
Chainsaw, Control - Uninoculated	15%	30%
Chainsaw, Control - Inoculated	13	95
Chainsaw, Borax - Inoculated	7	95
Shearer, TIM-BOR - Inoculated	0	60
Shearer, TIM-BOR - Uninoculated	0	10

TIM-BOR™ appears to be at least as effective as standard borax application in these trials. Levels of infection were high in the Devils Garden trial

because of the high level of inoculum used. Conversely, the McCloud inoculations did not appear to be effective. In both cases however, the TIM-BOR™ treatment did reduce the amount of infection.

DUTCH ELM DISEASE. The California Department of Forestry and Fire Protection confirmed 239 diseased elms in 1990. Overall, the number of diseased trees was comparable to disease activity in previous years (Table IX).

Dutch elm disease (DED) has expanded into the Central Valley of California. Ten trees were confirmed from Sacramento County, and a quarantine has been established in portions of San Joaquin, Sacramento, and Yolo Counties.

The incidence of DED in Santa Clara and Alameda counties increased dramatically from past years. The city of San Jose had 47 of Santa Clara County's 51 DED elms with most of the confirmations coming from several concentrated areas. In Alameda County, DED was widespread with confirmations in Piedmont, Oakland, and Berkeley. Alameda County is the only Bay Area county without a DED interior quarantine.

Marin County continued to show a reduction in diseased trees compared to previous years. Disease incidence was stable or increased slightly in Contra Costa, Napa, San Mateo and Sonoma Counties.

TABLE IX. NUMBER OF CONFIRMED TREES WITH DUTCH ELM DISEASE

COUNTY	1985	1986	1987	1988	1989	1990[c]
Alameda	0	11	7	3	3	23
Contra Costa	21	30	35	35	34	38
Marin	154	125	83	91	82	46
Napa	2	3	2	9	5	4
Sacramento	0	0	0	0	0	10
San Francisco	0	0	0	0	0	0
San Mateo	63	44	47	70	48	61
Santa Clara	34	41	20	35	32	51
Solano	0	1	0	0	0	0
Sonoma	28	14	16	12	3	6
Total	302	269	210	255	205	239

[c]Through December 31, 1990

TREE DIAGNOSES, CDF&A. The California Department of Food and Agriculture is frequently requested to identify the cause of injury or disease on various species of trees. The latest listing is given in Table IX.

Table X. CALIFORNIA DEPARTMENT OF FOOD AND AGRICULTURE, TREE DIAGNOSES 10/89 THROUGH 11/13/90

HOST TREE	DIAGNOSIS	COUNTY
Abies concolor (seedlings)	*Fusarium oxysporum*	Butte
Abies concolor (Christmas trees) (white fir)	*Pucciniastrum goeppertianum* (fir-huckelberry rust)	Humboldt
Abies magnifica (Seedlings)	*Fusarium oxysporum*	Butte
Abies magnifica (Christmas trees) (red fir)	*Armillaria mellea*	Nevada
Acer sp.	*Xylella fastidiosa* (bacterial scortch)	Glenn
Acer macrophyllum	*Rhytisma acerinum*	
Acer palmatum (Japanese maple)	Phenoxy herbicide injury	Sacramento
Acer palmatum (Japanese maple)	Verticillium wilt (*V. dahliae*)	Sacramento, Humboldt, Santa Barbara, Placer
Acer palmatum var. "Bloodgood" (Japanese maple)	Verticillium wilt (*V. dahliae*)	Santa Clara
Alnus sp.	*Cylindrosporium* sp. (leafspot)	Mendocino
Alnus sp.	*Septoria alnifolia* (leafspot)	Mendocino
Alnus sp. (firewood) (alder)	*Trametes versicolor* (conk)	State of Oregon
Arctostaphylos sp. (Manzanita)	*Fusicoccum aesculi* (canker)	San Diego
Calocedrus decurrens (seedlings) (Incense-cedar)	*Fusarium oxysporum*, root and hypocotyl rot	Butte
Casuarina glauca (beefwood)	Genetic fasciation	Fresno
Chamaecyparis pisifera (Sawara cypress)	*Pestalotiopsis funerea* (twig blight)	Santa Barbara
Chamaecyparis lawsoniana (Port-Orford-cedar)	*Stigmina thujina* (foliar spot)	Humboldt

Table X (Cont.)

HOST TREE	DIAGNOSIS	COUNTY
Cocos plumosa (nursery)	Gliocladium vermoseni (pink bud rot)	Santa Barbara
Cupressus macrocarpa	Pestalotiopsis funerea (canker)	San Francisco
Cupressus sempervirens	Botyosphaeria ribis (canker)	Sonoma
Eucalyptus sp.	Lignotubers (normal)	Stanislaus
Eucalyptus camaldulensis	Salt damage	Fresno
Eucalyptus globulus (blue gum)	Hydnangium carneum, false truffle, mycorrhizal	Glenn
Eucalyptus globulus (blue gum)	Hymenogaster albus, mycorrhizal	Glenn
Eucalyptus globulus (blue gum)	Setchelliogaster tenuipes, false truffle, mycorrhizal	Glenn
Eucalyptus lehmanii	Glyphosate injury & oedema	Santa Barbara
Eucalyptus rudis	Oedema	Santa Barbara
Eucalyptus sideroxylon (Red ironbark)	Cedema	Sacramento
Fraxinus sp. (ash)	Cercosporella trichophila (leaf spot)	Trinity
Fraxinus sp. (ash)	Pleurotus ostreatus (wood rot)	Sacramento
Fraxinus uhdei	Pleurotus ostreatus & Polyporus sp. (wood rot)	Sacramento
Heteromeles arbutifolia	Fusicoccum aesculi (canker)	Orange
Liquidambar styraciflua (sweetgum)	Glyphosate injury	Sacramento
Magnolia soulangiana	Oedema	Santa Cruz
Myrica californica (a wax myrtle)	Ramularia destructiva (leaf spot)	Humboldt
Osmanthus fragrans	Oedema	Santa Cruz
Persea americana	Ganoderma lucidum	Shasta

Table X (Cont.)

HOST TREE	DIAGNOSIS	COUNTY
Pinus lambertiana (seedlings)	Fusarium oxysporum	Butte
Pinus monophylla (singleleaf pinyon)	Sphaeropsis sapinea (=Diplodia pinea)	Santa Barbara
Pinus ponderosa (seedlings) (ponderosa pine)	Phoma eupyrena	Amador
Pinus radiata (Monterey pine)	Fusarium lateritium	Alameda
Pinus radiata (gall, western gall rust)	Fusarium subglutinans (pitch canker)	Santa Cruz
Pistacia chinensis (Chinese pistachio)	Verticillium dahliae (Verticillium wilt)	Sacramento
Platanus sp. ("Columbia sycamore")	Discula umbrinella (anthracnose)	San Mateo
Platanus orientalis (oriental plane)	Microsphaera penicillata (powdery mildew)	Sacramento
Populus sp. (poplar)	Cytospora chrysosperma mechanical wounding, borers	Siskiyou
Populus tremuloides (aspen)	Marssonina castagnei (leaf spot)	Siskiyou
Prunus domestica (common garden plum)	Pseudomonas syringae pv. syringae (bacterial canker)	Yolo
Prunus hyedoensis	Armillaria mellea	Sacramento
Prunus hyedoensis var. akebono	Plum line pattern virus	Placer
Prunus persica (peach)	Sphaerotheca pannosa (powdery mildew)	Yolo
Prunus persica (peach)	Tranzschelia discolor (rust)	San Luis Obispo
Prunus persica var. nucipersica	Sphaerotheca pannosa (powdery mildew)	Yolo
Prunus virginiana (choke cherry)	Apiosporina morbosa (=Dibotryon morbosum, "black knot")	Tulare
Pseudotsuga menziesii	Phellinus pini	Siskiyou

Table X (Cont.)

HOST TREE	DIAGNOSIS	COUNTY
Pyrus communis (common pear)	Erwinia amylovora (fire blight)	Placer
Pyrus kawakamii	Armillaria mellea	Sacramento
Pyrus kawakamii	Entomosporium mespili (leaf spot)	San Francisco Sacramento
Quercus agrifolia (coast live oak)	Sphaerotheca lanestris (powdery mildew)	San Luis Obispo
Quercus kellogii (California black oak)	Septoria dryina (leaf spot)	Trinity
Quercus lobata	Diplodia quercina	Sacramento
Quercus lobata (seedlings) (valley oak)	Macrophomina phaseolina (charcoal rot)	Sacramento
Quercus wislizenii (interior live oak)	Cryptocline cinerescens (twig dieback)	Butte
Salix sp.	Melampsora epitea	San Mateo
Sequoiadendron gigantea (giant sequoia)	Botryosphaeria ribis (canker)	Napa
Sequoiadendron gigantea (giant sequoia)	Botrytis cineria (seedling blight)	Yolo
Sequoiadenendron giganteum (seedling)	Macrophomina phaesolina	Butte
Ulmus pumila (Siberian elm)	Phoenix herbicide injury	Sacramento
Washingtonia robusta	Sphaerodothis neowashintoniae (leaf spot)	Santa Barbara

UNITED STATES DEPARTMENT OF AGRICULTURE - FOREST SERVICE

CALIFORNIA FOREST PEST COUNCIL

FOREST PEST DETECTION REPORT

I. FIELD INFORMATION (See instructions on reverse)

1. COUNTY:

2. FOREST (FS ONLY):

3. DISTRICT (FS ONLY):

4. LEGAL DESCRIPTION:
T. _____ R. _____
section (s) _____

5. DATE:

6. LOCATION:

7. LANDOWNERSHIP:
- FOREST SERVICE ☐
- OTHER FEDERAL ☐
- STATE ☐
- PRIVATE ☐

8. SUSPECTED CAUSE(S) OF INJURY:
- 1. INSECT ☐
- 2. DISEASE ☐
- 3. ANIMAL ☐
- 4. WEATHER ☐
- 5. CHEMICAL ☐
- 6. MECHANICAL ☐
- 7. WEED ☐
- 8. UNKNOWN ☐

9. SIZE(S) OF TREES AFFECTED:
- 1. SEEDLING ☐
- 2. SAPLING ☐
- 3. POLE ☐
- 4. SAWTIMBER ☐
- 5. OVERMATURE ☐

10. PART(S) OF TREE AFFECTED:
- 1. ROOT ☐
- 2. BRANCH ☐
- 3. LEADER ☐
- 4. BOLE ☐
- 5. TWIG ☐
- 6. FOLIAGE ☐
- 7. BUD ☐
- 8. CONE ☐

11. SPECIES AFFECTED:

12. NUMBER AFFECTED:

13. ACRES AFFECTED:

14. INJURY DISTRIBUTION:
1. SCATTERED ☐ 2. GROUPED ☐

15. STATUS OF INJURY:
1. DECREASING ☐ 2. STATIC ☐ 3. INCREASING ☐

16. ELEVATION:

17. PLANTATION?
1. YES ☐
2. NO ☐

18. STAND COMPOSITION (SPECIES):

19. STAND AGE AND SIZE CLASS:

20. STAND DENSITY (BASAL AREA):

21. SITE QUALITY:

22. PEST NAMES (IF KNOWN) AND REMARKS (SYMPTOMS AND CONTRIBUTING FACTORS):

23. SAMPLE FORWARDED?
1. YES ☐
2. NO ☐

24. ACTION REQUESTED:
1. INFORMATION ONLY ☐
2. LAB IDENTIFICATION ☐
3. FIELD EVALUATION ☐

25. REPORTER'S NAME:

26. REPORTER'S AGENCY:

27. REPORTER'S ADDRESS & PHONE NUMBER:

II. REPLY (PEST MANAGEMENT USE)

28. RESPONSE:

29. REPORT NUMBER:

30. DATE:

31. EXAMINER'S SIGNATURE:

R5-3400-1 (Rev. 3/90)

THE COOPERATIVE FOREST PEST DETECTION SURVEY is sponsored by the California Forest Pest Council. The Council encourages federal, state, and private land managers and individuals to contribute to the Survey by submitting pest injury reports and samples in the following manner.

FEDERAL PERSONNEL. Send all detection reports through channels. Mail injury samples with a copy of this report to one of the following appropriate offices:

USDA Forest Service
State and Private Forestry
630 Sansome Street
San Francisco, CA 94111

Forest Pest Management
Shasta-Trinity National Forests
2400 Washington Avenue
Redding, CA 96001

Forest Pest Management
Stanislaus National Forest
19777 Greenley Road
Sonora, CA 95370

STATE PERSONNEL. Send all detection reports through channels. Mail injury samples with a copy of this report to one of the following appropriate offices:

California Dept. of Forestry
and Fire Protection
P.O. Box 1590
Davis, CA 95617

California Dept. of Forestry
and Fire Protection
6105 Airport Road
Redding, CA 96002

California Dept. of Forestry
and Fire Protection
776 S. State Street, #107
Ukiah, CA 95482-5891

PRIVATE LAND MANAGERS AND INDIVIDUALS. Send all detection reports and samples to the closest California Department of Forestry and Fire Protection office listed above.

COMPLETING THE DETECTION REPORT FORM

HEADING (BLOCKS 1-7). Enter all information requested. In Block 6, LOCATION, provide sufficient information for the injury center to be relocated. If possible, attach a location map to this form.

INJURY DESCRIPTION (BLOCKS 8-15). Check as many boxes as are applicable, and fill in the requested information as completely as possible.

STAND DESCRIPTION (BLOCKS 16-21). This information will aid the examiner in determining how the stand conditions contributed to the pest situation. In Block 18, indicate the major tree species in the overstory and understory. In Block 19, indicate the stand age in years, and/or the size class (seedling-sapling; pole; young sawtimber; mature sawtimber; overmature, or decadent).

PEST NAMES (BLOCK 22). Write a detailed description of the pest or pests, the injury symptoms, and any contributing factors.

ACTION REQUESTED (BLOCK 24). Mark "Field Evaluation" only if you consider the injury serious enough to warrant a professional evaluation. Mark "Information Only" if you are reporting a condition that does not require further attention. All reports will be acknowledged and questions answered on the lower part of this form.

REPLY (SECTION II). Make no entries in this block; for examining personnel only. A copy of this report will be returned to you with the information requested.

HANDLING SAMPLES. Please submit injury samples with each detection report. If possible, send several specimens illustrating the stages of injury and decline. Keep samples cool and ship them immediately after collection. Send them in a sturdy container, and enclose a completed copy of the detection report.

YOUR PARTICIPATION IN THE COOPERATIVE FOREST PEST DETECTION SURVEY IS GREATLY NEEDED AND APPRECIATED. Additional copies of this form are available from the Forest Service, Forest Pest Management, and from the California Department of Forestry and Fire Protection.

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Council Chair: Lloyd Bradshaw (Simpson Timber Co., Klamath)

Council Vice-Chair: Dave Burns (RPF, Auburn)

Council Secretary: Gregg DeNitto (USDA-Forest Service, Redding)

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Secretary: John Dale (USDA-Forest Service, San Francisco)

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Chair: Melissa Marosy (USDA-Forest Service, San Francisco)

Secretary: Tim Tidwell (CA Dept. of Food & Agriculture, Sacramento)

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Secretary: Robin Breckenridge (CA Dept. Food & Agriculture, Sacramento)

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The Executive Committee is composed of the Council Chair, Vice-Chair, Council Secretary, the Standing Committee Chairs (6), and 3 members-at-large:

Herb Baldwin (Roseburg Resources Co., Anderson)

Scott Johnson (Wilbur-Ellis Co., Stockton)

Robert Schmidt (UC-Berkeley, Hopland Field Station, Hopland)

CALIFORNIA DEPARTMENT OF FORESTRY
AND FIRE PROTECTION
1416 NINTH STREET
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SACRAMENTO, CA 94244-2460

TO: